

# The Introduction of the Moldboard Plow to Byzantine Thrace in the Eleventh Century

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During the last two decades or so, the shift of scholarly focus in Byzantine studies from political and diplomatic history to social, cultural, and economic history has led to a systematic reevaluation of the historiography of Byzantium, especially of earlier treatments of the late Byzantine economy as malfunctioning, unique, and isolated from wider European developments. The new, revisionist trend in Byzantine studies, resulting from the accumulated archaeological and numismatic data, has been best illustrated by the collection of studies entitled *The Economic History of Byzantium from the Seventh through the Fifteenth Century*, which promotes the view of a Byzantine socioeconomic model as a thriving part of Mediterranean and European economic environment, no less efficient than its western European counterparts.<sup>1</sup>

In sharp contrast with the revisionist overtones of *The Economic History*, single but authoritative voices still maintain that Byzantine technical capabilities in agriculture did not change much between antiquity and the late Middle Ages. Doubts about Byzantine technical capabilities have been cast especially because of the lack of evidence for the use of the “heavy” (moldboard) plow and the overshot watermill. In his chapter for *The Economic History*, Anthony Bryer declared the “heavy plow” to be unknown in Byzantine agriculture,

which made an almost exclusive use of the primitive ard (the scratch plow), as well as the horizontal, direct-drive scoop-vaned turbine, both known from antiquity.<sup>2</sup> Bryer’s objection to the optimistic choir concerning the Byzantine economy in *The Economic History* is not unique. It actually revives Michel Kaplan’s older understanding of Byzantine agriculture, according to which the inefficiency of Byzantine agriculture can be explained in terms of the institutional failure of the Byzantine state to stimulate investment and innovations.<sup>3</sup> Given the fundamental importance of technological innovation in general, as well as of the heavy plow and the overshot watermill in particular, for the “agricultural revolution” and subsequent economic upheaval in the West, their absence from the late Byzantine countryside conjures old stereotypes about Byzantium as a society marked by technological stagnation, low productivity, and inadequate institutions.<sup>4</sup>

1 A. Laiou, ed., *The Economic History of Byzantium from the Seventh through the Fifteenth Century*, 3 vols., DOS 39 (Washington, DC, 2002).

2 A. Bryer, “The Means of Agricultural Production: Muscle and Tools,” in Laiou, *Economic History*, 1:101–13.

3 M. Kaplan, *Les hommes et la terre à Byzance du VI<sup>e</sup> au XI<sup>e</sup> siècle: Propriété et exploitation du sol*, Série Byzantina Sorbonensia 10 (Paris, 1992), 48–50.

4 Although Kaplan’s notion of a “société bloquée,” built in turn on Nicolas Svoronos’s and to some extent Paul Lemerle’s views of eleventh-century Byzantium, has been systematically eroded after the work of Alan Harvey (particularly *Economic Expansion of the Byzantine Empire, 900–1200* [Cambridge, 1989]), this view still dominates the Western perception of Byzantine society. For details, see D. Angelov, “Byzantinism: The Imaginary and Real Heritage of

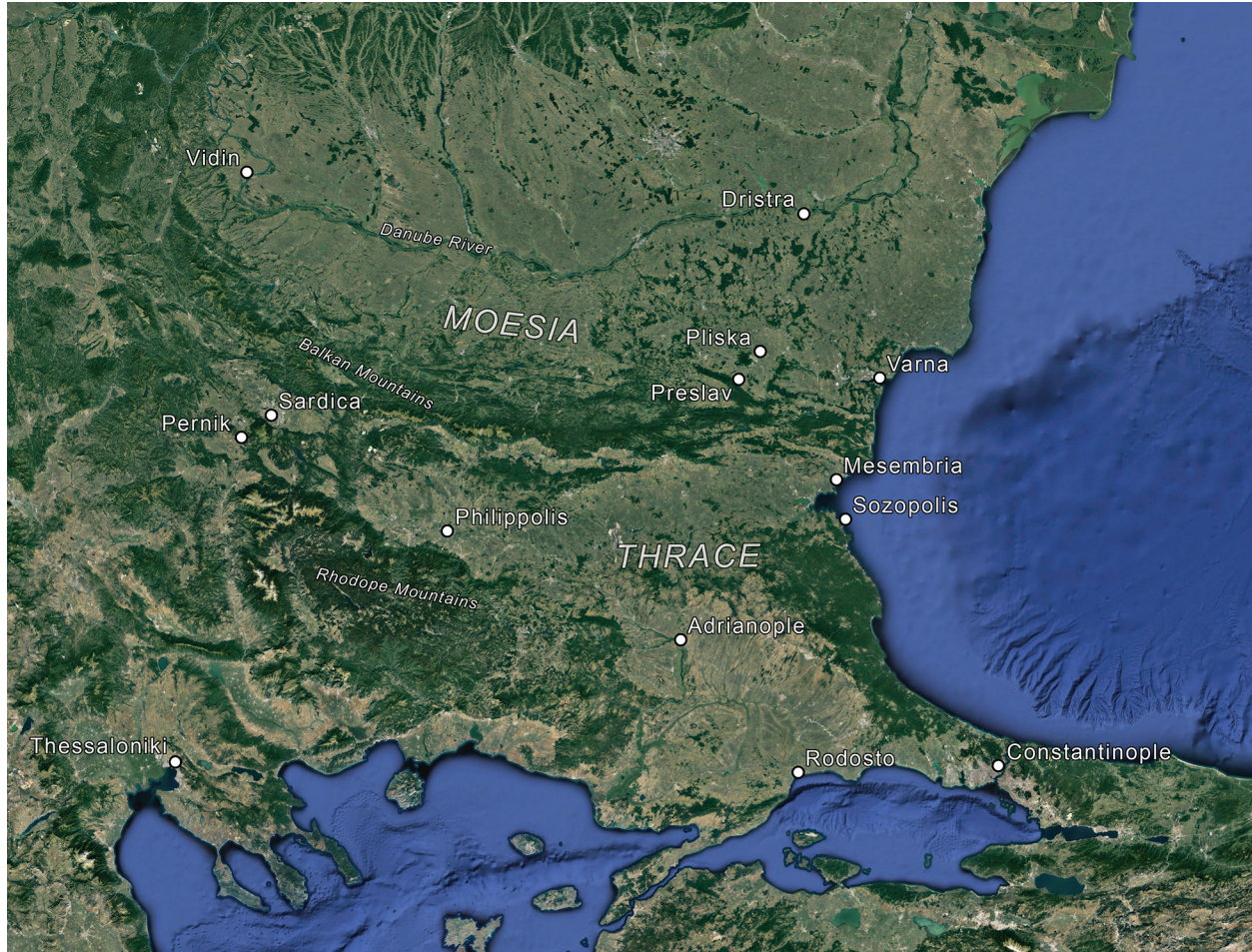


Fig. 1. Map of Moesia and Thrace, with major cities and features. Underlying image courtesy of Google Earth.

In an attempt to surmount the inconclusive data for assessing the technological capacity of Byzantine agriculture, this paper offers an interpretation of archaeological evidence pertaining to the moldboard plow in eleventh-century Thrace (fig. 1), from the territories of Bulgaria, Northern Greece, and the European part of Turkey, which has accumulated in the course of the last thirty-five years.<sup>5</sup> The results of this research

indicate that the appearance and spread of the plow in the heavy clay soil zones of Thrace was an exogenous phenomenon determined by microregional climatic and soil conditions.

Ever since Lynn White, Georges Duby, and Marc Bloch identified the heavy plow as the most important element in the “agricultural revolution,” technological innovation has become a fundamental historical datum in medieval economic history.<sup>6</sup> In subsequent

Byzantium in Southeastern Europe,” in *New Approaches to Balkan Studies*, ed. D. Keridis, E. Elias-Bursac, and N. Yatromanolakis (Dulles, 2003), 3–23.

<sup>5</sup> Thrace is understood here as a geographic region, roughly coinciding with the Roman province of Thrace, rather than the eleventh-century Byzantine theme of Thrace. For the historical geography, including climate, landscape, and hydrological resources of Thrace, see P. Soustal, *Tabula Imperii Byzantini*, vol. 6, *Thrakien (Thrakê, Rodopê und Haimimontos)*, DenkWien 221 (Vienna, 1991);

and A. Külzer, *Tabula Imperii Byzantini*, vol. 12, *Ost-Thrakien*, DenkWien 369 (Vienna, 2007).

<sup>6</sup> L. White Jr., *Medieval Technology and Social Change* (Oxford, 1962); G. Duby, *L'économie rurale et la vie des campagnes dans l'occident médiéval: France, Angleterre, Empire, IX<sup>e</sup>–XV<sup>e</sup> siècles. Essai de synthèse et perspectives de recherches* (Paris, 1962); M. Bloch, *French Rural History: An Essay on Its Basic Characteristics* (Berkeley, 1966). A good summary of the historiography on the heavy plow is



years, despite rising criticism of White's technological determinism,<sup>7</sup> a large volume of evidence has been accumulated pointing at the crucial importance of the heavy plow for expanding arable land and escaping the Malthusian trap through technological adaptation and sustained productivity.<sup>8</sup>

Certainly, archaeology has played a central role not only in the accumulation of evidence, but also in the reconstruction of these technological processes and the interpretation of their social context. However, *medieval* archaeology is a relatively new discipline, even in countries with well-established archaeological traditions. In France, for instance, medieval archaeology only began to develop "seriously," as Georges Comet puts it, in the 1950s.<sup>9</sup> In Britain, the roots of medieval archaeology were established well before World War II, but the Society for Medieval Archaeology emerged only in 1957.<sup>10</sup> The situation was similar in Germany, Austria, and Switzerland.<sup>11</sup> Locked in the culture-history paradigm, the medieval archaeologies of Greece, Turkey, and Bulgaria, the countries that inherited the core territories of post-sixth-century Byzantium, lagged well behind their Western counterparts.<sup>12</sup> Up to the late 1970s, for

instance, in most excavations in Turkey and Greece, medieval (Byzantine) strata were routinely destroyed in favor of the more sensational classical layers, often without even being recorded.<sup>13</sup> In Bulgaria, because its historical experience was more closely related to the Middle Ages, considerations of ethnogenesis and political ideology led to greater attention to medieval sites, but the results rarely went beyond mere description.

Due to the scarcity of archaeological data for Byzantine agriculture coming from Greece and Turkey and to language barriers and restrained contacts with archaeologists of the countries behind the Iron Curtain, Byzantinists from the West, such as Bryer and Kaplan, have confined their research to other sources. Bryer's insights into the history of Byzantine farm implements thus rest primarily on his ethnographic surveys in modern Anatolia and on sources like the late Byzantine illustrations in several copies of Hesiod's *Works and Days*, which, according to Bryer, illustrate the agricultural practices from the tenth to the fourteenth century.<sup>14</sup> While a late Byzantine copy of Hesiod's work could be taken as a good indicator for the growing interest in copying and editing classical Greek texts in the context of the Byzantine cultural revival of the time (also known as the Palaiologian Renaissance), it could hardly be used as a reliable source for depicting accurately and comprehensively the tilling practices of Byzantine agriculture.

Michael Kaplan assesses the economic development of Byzantium through the lens of Douglass North's institutional economic theory.<sup>15</sup> He sees Byzantine technological capacity in general and Byzantine agriculture in particular as a function of state institutions, which he holds responsible for not creating adequate economic

available in T. B. Andersen, P. S. Jensen, and C. V. Skovsgaard, "The Heavy Plow and the Agricultural Revolution in Medieval Europe," *Journal of Development Economics* 118 (2016): 133–49.

7 See, e.g., P. H. Sawyer and R. H. Hilton, "Technical Determinism: The Stirrup and the Plough," *Past & Present* 24.1 (1963): 90–100.

8 See M. M. Postan, ed., *The Cambridge Economic History of Europe*, vol. 1, *The Agrarian Life of the Middle Ages*, 2nd ed. (Cambridge, 1966); D. C. North and R. P. Thomas, "An Economic Theory of the Growth of the Western World," *EcHistR* 23.1 (1970): 1–17; G. Astill and J. Langdon, eds., *Medieval Farming and Technology: The Impact of Agricultural Change in Northwest Europe*, Technology and Change in History 1 (Leiden, 1997); J. E. Jensen, *Gensidig afhængighed: En arv fra fortiden. Danmarks middelalderbyer—et vidnesbyrd om spredningen af vestlig civilisation* (Odense, 2010).

9 G. Comet, "Technology and Agricultural Expansion in the Middle Ages: The Example of France North of the Loire," in Astill and Langdon, *Medieval Farming and Technology*, 11–40, at 13.

10 C. M. Gerrard, "Overview: People and Projects," in *The Oxford Handbook of Later Medieval Archaeology in Britain*, ed. C. M. Gerrard and A. Gutierrez (Oxford, 2018), 3–19, at 6.

11 G. P. Fehring, *The Archaeology of Medieval Germany: An Introduction*, trans. R. Samson (London, 2014).

12 W. R. Caraher, L. J. Hall, and R. S. Moore, eds., *Archaeology and History in Roman, Medieval and Post-Medieval Greece: Studies on Method and Meaning in Honor of Timothy E. Gregory* (Aldershot, 2008); T. E. Gregory, "Commentary: Medieval and Post-Medieval Archaeology of Greece," *International Journal of Historical*

*Archaeology* 14.2 (2010): 302–7; D. W. Bailey, "Bulgarian Archaeology: Ideology, Sociopolitics, and the Exotic," in *Archaeology under Fire: Nationalism, Politics and Heritage in the Eastern Mediterranean and Middle East*, ed. L. Meskell (London, 1998), 87–110.

13 For Greece, see J. Rosser, "A Research Strategy for Byzantine Archaeology," *ByzSt* 6 (1979): 152–66. For Turkey, see M. Özdoğan, "Ideology and Archaeology in Turkey," in Meskell, *Archaeology under Fire*, 111–24; B. Ahibay, "Theoretical Approaches in Turkish Archaeology" (MA thesis, Bilkent University, 2007), 43–44.

14 Hesiod's *Works and Days* is an instructional poem about agricultural practices written ca. 700 BCE. See A. Bryer, "The Means of Agricultural Production," 106; idem, "Byzantine Agricultural Implements: The Evidence of Medieval Illustrations of Hesiod's *Works and Days*," *BSA* 81 (1986): 45–80.

15 Kaplan, *Les hommes*, 48–50.

incentives for technical advance. His approach, however, only proves North's point about the pitfalls of assessing institutional development deductively, instead of empirically.<sup>16</sup> Kaplan relies on hagiographic sources, which rarely refer to any technological details of agricultural reality, and are no more instructive about tilling devices than a late medieval copy of *Works and Days* or surviving wills and monastic *praktika*.

Attempts at explaining the lack of evidence for the use of the moldboard plow have been limited to the work of Angeliki Laiou. By pointing to the detrimental consequences of a mechanical importation of Western categories (e.g., serfdom) into Byzantine studies, particularly for the interpretation of social and economic developments in Middle and Late Byzantium, Laiou questions the one-to-one relation between economic advances in agriculture and the introduction of the plow, and thus she effectively tables the plow debate.<sup>17</sup> A number of leading specialists in Byzantine economic history such as John Teall, Alexander Kazhdan, Alan Harvey, Gennady Litavrin, and Jacques Lefort have adopted similar positions.<sup>18</sup> All of them base their assertions upon written sources and illustrations and attribute the absence of the moldboard plow from Byzantine agriculture to its unsuitability for the light and dry soils of the Mediterranean. At the time, archaeological evidence seemingly supported that view. There are very few finds of plowshares from early Byzantine sites in the Peloponnese (only Olympia and Pyrgouthi), and all have been classified as belonging to the scratch plow known from antiquity.<sup>19</sup> However, what seems to be ignored by the advocates of this view is that before

the mid-fourteenth century the political borders of the Byzantine Empire stretched well beyond the zone of Mediterranean light and dry soils.

To be sure, archaeological evidence for the introduction of the moldboard ("heavy") plow in the region of heavy and poorly drained clay soils (chernozems, smolnitz) of Moesia and Thrace during the late tenth and early eleventh centuries was published two decades before *The Economic History* and ten years before Kaplan's indictment of the Byzantine institutional capacity for economic growth. In his pathbreaking survey of farm implements in Southeastern Europe, Joachim Henning offers a picture of continuity in the course of the first millennium, based on the collections of archaeological museums in Bulgaria, Romania, Hungary, and Yugoslavia.<sup>20</sup> Although the archaeological excavations of the last thirty-five years<sup>21</sup> discussed in this paper have confirmed and expanded most of Henning's suppositions, some new conclusions must be acknowledged as well: first, there are no signs of heavy

16 D. North, *Structure and Change in Economic History* (New York, 1981).

17 A. E. Laiou, "Methodological Questions Regarding the Economic History of Byzantium," *ZRVI* 39 (2001/2002): 9–24.

18 J. L. Teall, "The Grain Supply of the Byzantine Empire, 330–1025," *DOP* 13 (1959): 87–139; A. P. Kazhdan and A. W. Epstein, *Change in Byzantine Culture in the Eleventh and Twelfth Centuries* (Berkeley, 1985), 8, 27; Harvey, *Economic Expansion*, 122–23, 257; G. Litavrin, "Osobennosti agrarnogo rezhima v bolgarskikh femakh v XI–XII vv.," in *Obraz i slovo / Εικόνα και λόγος: Iubileen sbornik po sluchai 60 godishnina na Prof. Aksiniia Dzhurova*, ed. V. Velinova, R. Boiadzhiev and A. Milanova (Sofia, 2004), 145–49; J. Lefort, "The Rural Economy, Seventh–Twelfth Centuries," in Laiou, *Economic History*, 231–310, at 235.

19 T. Völling, "Early Byzantine Agricultural Implements from Olympia (5th/6th Centuries A.D.)," in *Πρωτοβυζαντινή Μεσσηνή και Ολυμπία: Αστικές και αγροτικές χώρες στη Δυτική Πελοπόννησο*.

*Πρακτικά του διεθνούς συμποσίου, Αθήνα 29–30 Μαΐου 1998*, ed. P. Themelis and V. Konti (Athens, 2002), 195–207, at 196.

20 J. Henning, *Südosteuropa zwischen Antike und Mittelalter: Archäologische Beiträge zur Landwirtschaft des 1. Jahrtausends u.Z.* (Berlin, 1987).

21 For the archaeological finds of asymmetric plowshares from Sredishte, see G. Atanasov, "Za prehoda ot ralo kum plug," *Bulgarska Etnografia* 2 (1985): 24–34; for Skala, see V. Iotov and G. Atanasov, *Skala: Krepost ot X–XI vek do s. Kladentsi, Tervelsko* (Sofia, 1998), 83; for Preslav and its hinterland, see S. Vitliyanov, "Kolektivna nahodka ot zemedelski orudia ot okolnostite na Preslav," *Bulgarska Etnografia* 1 (1988): 26–30; idem, "Osobnosti na niakoi zemedelski oradiia na truda v srednovekovna Bulgaria," *Pliska–Preslav* 5 (1992): 231–38; idem, "Kolektivna nakhodka ot oradiia na truda i predmeti na bita ot s. Markovo, Varnensko," *Trudove na katedrite Istoriia i Bogoslovie kam Shumenskiia universitet "Episkop Konstantin Preslavski"* 2 (1998): 40–46; idem, "Ein Hortfund mit Eisengegenständen aus Pliska und das Problem der frühmittelalterlichen Agrartechnik in Bulgarien," in *Post-Roman Towns, Trade and Settlement in Europe and Byzantium*, vol. 2, *Byzantium, Pliska, and the Balkans*, ed. J. Henning (Berlin, 2007), 393–402; see also I. Cholakov, *Rimski i rannovizantiiski metalni instrumenti ot teritoriiata na Balgaria (I–nachaloto na VII vek)* (Sofia, 2010); A. Cholakova, "Rannovizantiiski kompleks ot zhelezni sechiva i predmeti ot Odarci (aspekti v izsledvaneto na kolektivnite nakhodki)," *Arkheologia* 46 (2005): 147–58; V. Iotov, "Nakhodka ot zhelezni predmeti ot okolnostta na s. Grozdevo, Provadiisko," *Izvestiia na Narodniia muzei Varna* 28 (1992): 224–28; H. Kouzov, "A Find of Medieval Iron Objects from a Fortress near the Village of Dolishte, Varna District (Bulgarian Black Sea Coast)," *Archaeologia Bulgarica* 4.2 (2000): 85–91; S. Vitliyanov and Y. Dimitrov, "Zashtitno vuorazhenie ot Preslav," *Preslav: Sbornik* 5 (1993): 165–77.



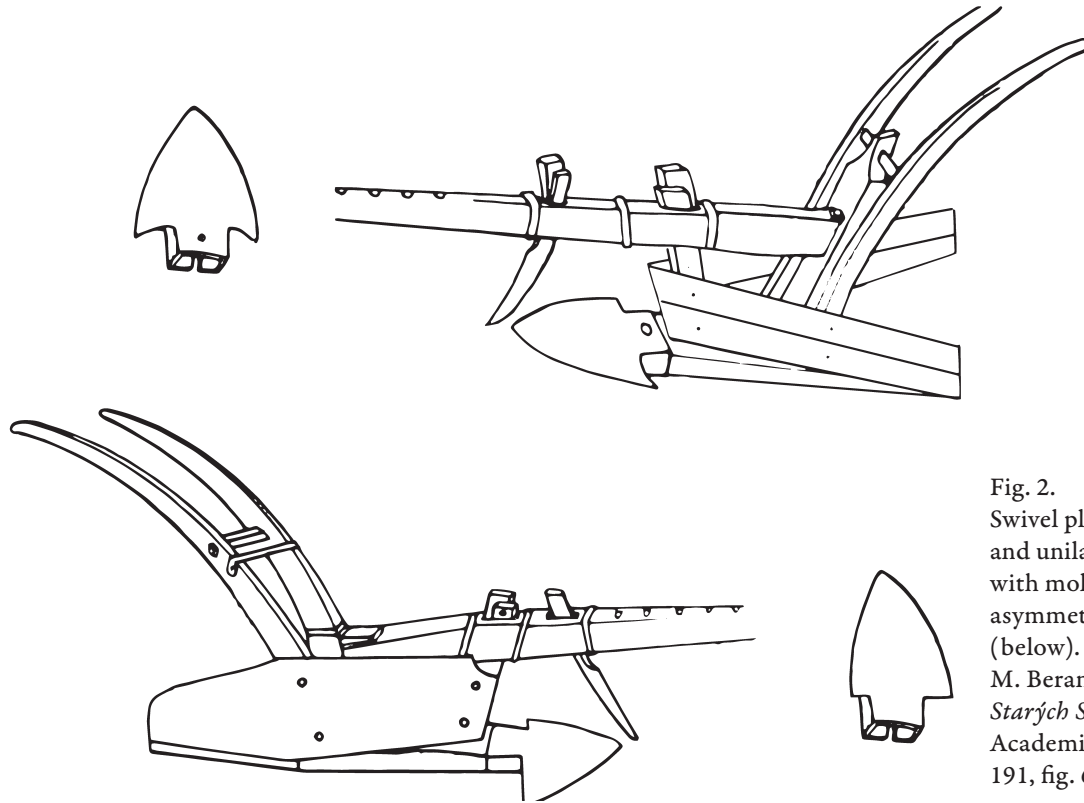


Fig. 2.  
Swivel plow (above)  
and unilateral plow  
with moldboard and  
asymmetrical share  
(below). Drawings after  
M. Beranová, *Zemědělství  
Starých Slovanů* (Prague:  
Academia, 1980),  
191, fig. 6.

plow use in Moesia and Thrace in the Roman period and in the early Middle Ages; second, secure archaeological data shows that the plow was introduced in the tenth century by the Bulgar inhabitants of Moesia, under the influence of the Volyntsevo-Romny and Raikovetska cultures of the Pontic steppe region.

Due to its territorial and chronological scope, Henning's work does not seem to have caught the attention of scholars studying Byzantium. Carried out in the concluding years of the Cold War, Henning's research was limited to the territories of the former Soviet bloc (plus Yugoslavia) and did not include either Greece or Turkey, territories which were the core of eighth- to tenth-century Byzantium. Moreover, as the upper chronological limit of Henning's project, the end of the first millennium, coincided roughly with the Byzantine conquest of the Bulgarian lands north of the Balkan Mountains (Moesia), where there was incontrovertible evidence for the use of the moldboard plow, he had nothing to say about the subsequent transmission of the plow to the heavy-clay soils of Thrace, a process that took place in the first half of the eleventh century.

## The Plowing Device

What exactly is a "heavy plow"? The element that distinguishes a heavy plow from an ard is the adoption of a moldboard and coulter, both of which allow for deeper tillage and can turn grass sods over in order to make a furrow.<sup>22</sup> It must be kept in mind that "heavy plow" is a stock phrase that designates a tilling device with a wide range of variations. Yet despite its typological variety (with or without wheels, and with several

22 M. Beranová, *Zemědělská výroba v 11./14. století na území Československa* (Prague, 1975), 174–98; Comet, "Technology and Agricultural Expansion"; Henning, *Südosteuropa*, 48–61; J. Hermann, "Tendenzen und Grundlinien der Produktivkraftentwicklung an der Wende von der Antike zum Mittelalter," in *Produktivkräfte und Gesellschaftsformationen in vorkapitalistischer Zeit*, ed. J. Herrmann and Irmgard Sellnow (Berlin, 1982), 499–524; Y. A. Krasnov, *Drevnie i srednevekovye pashotnye orudija Vostochnoj Evropy* (Moscow, 1987); G. Lerche, *Ploughing Implements and Tillage Practices in Denmark from the Viking Period to about 1800: Experimentally Substantiated*, Commission for Research on the History of Agricultural Implements and Field Structures 8 (Herning, 1994).

types of adjustment and assembly), a tool must have three fundamental parts in order to be considered a “heavy plow”: a coulter, a plowshare (whether symmetric or asymmetric), and a moldboard. It must be noted, however, that the coulter and the symmetric plowshare are also employed in the swivel plow, a transitional model from the ard to the moldboard plow (fig. 2). The swivel plow uses either a flying board that changes its location alternatively, on the left or right side of the plow, or two narrow wooden planks attached as wings above the plowshare that turn the soil sods first to one side and move the next furrow back to the other side of the plow, hence the symmetric shape of its plowshare. Although capable of making furrows, these planks are smaller and shallower than the moldboard of the heavy plow.

Moldboard plows invariably have asymmetric shares as a result of their tilling patterns, which were circular, unlike the crisscross patterns of ards or swivel plows. Because the moldboard (commonly attached on the right side of the plow) is unmovable and quite large in comparison to the wooden planks of the swivel plow, the heavy plow was used to till land in a clockwise motion, always leaving the moldboard within the tilled portion of the field and exposing one and the same shoulder of the plowshare to the abrasive force of soil cutting. This is a key observation for the interpretation of the archaeological finds. Asymmetric plowshares belong to the moldboard plow, whether they were deliberately made asymmetric or their asymmetry resulted from wear (often intensified by corrosion). Because the wooden moldboard itself is perishable, the asymmetric plowshare is the only surviving evidence of moldboard plows.

Henning has established a typology of asymmetric plowshares, which I will also adopt in this article: type A1 includes plowshares with left asymmetry up to 1 cm; A2, specimens with left asymmetry greater than 1 cm; A3 and A4 are plowshares with right asymmetry up to and greater than 1 cm, respectively.

### Microregional Diversity: Climate Conditions and Soil Properties

The production of grain and its distribution from grain-producing regions have never lost their importance in the eyes of historians of Byzantium, since grain shortages always reflected political upheavals in the

empire.<sup>23</sup> Recently, the appearance of case studies dealing with microregional climatic and soil characteristics, including geochemistry, pollen analyses, and archaeological artifacts, demonstrate the potential of this “multiproxy” approach for illuminating the connection between land-use fluctuations and social changes.<sup>24</sup>

After the loss of Egypt in the seventh century and Sicily in the ninth century, the empire’s grain-producing regions were reduced to Anatolia and Thrace. The agricultural potential of Thrace, however, was not based on light and dry Mediterranean soils, but on heavy clay and poorly drained chernozems and chernozem-like vertisols (or smolnitz soils), both of which are highly fertile.<sup>25</sup> Chernozems and vertisols are dark in color, with up to four percent organic matter, and a heavy clay texture. They shrink and swell as their water content changes, which constitutes the greatest problem for their tillage, as the soils are very sticky when they are wet and hard when they are dry. Given their susceptibility to waterlogging and their narrow range between moisture stress and water excess, the adequate management of those soils requires a careful maintenance of water balance. The most effective method to protect crops on Thracian chernozems and vertisols from waterlogging (at the end of the winter season) and water loss (during the dry summers) is deep plowing and furrowing that enhances the infiltration of water in the soil and protects the soils from water loss and surface cracking. As neither deep plowing nor furrowing are within the capacity of the ard, sustained grain production in the chernozem or vertisol regions

23 A. E. Laiou, “The Agrarian Economy, Thirteenth–Fifteenth Centuries,” in Laiou, *Economic History*, 311–75, at 326; A. E. Laiou-Thomadakis, “The Byzantine Economy in the Mediterranean Trade System: Thirteenth–Fifteenth Centuries,” *DOP* 34/35 (1980/81): 177–222; Lefort, “Rural Economy,” 250–51; Teall, “Grain Supply.”

24 J. Haldon, N. Roberts, A. Izdebski, D. Fleitmann, M. McCormick, M. Cassis, O. Doonan, W. Eastwood, H. Elton, S. Ladstätter, S. Manning, J. Newhard, K. Nichol, I. Telelis, and E. Xoplaki, “The Climate and Environment of Byzantine Anatolia: Integrating Science, History and Archaeology,” *Journal of Interdisciplinary History* 45.2 (2014): 113–61; A. Izdebski and M. Mulryan, eds., *Environment and Society in the Long Late Antiquity*, *Late Antique Archaeology* 11–12 (Leiden, 2019).

25 P. Zdruli, S. Kipur, and I. Çelik, “Soils of the Mediterranean Region, Their Characteristics, Management, and Sustainable Use,” in *Sustainable Land Management: Learning from the Past for the Future*, ed. S. Kapur, H. Eswaran, W. E. H. Blum (Berlin, 2011), 125–42.



of Thrace is virtually impossible without the use of the heavy plow. Of course, this conclusion provokes an immediate question: how, then, were Thracian chernozems and vertisols tilled during the Thracian period and the following Roman period without the use of a furrow-making plow? The answer is suggested by Joachim Henning's map of excavated ard shares from antiquity, where all specimens are located in the alluvial soils of the valleys of the Thracian and Moesian rivers.<sup>26</sup> Their light and well-drained soils are much easier for cultivation than chernozems and vertisols.

### Data Collection

Archaeological evidence for the use of the moldboard plow in Thrace comes exclusively from museums in Bulgaria. According to my survey of inventories, administrations, and local archaeologists in the museums of the European part of Turkey (eastern Thrace) and of northern Greece (Aegean Thrace), including those of Tekirdağ, Edirne, Alexandroupolis, Didymoteichon, Kavala, Komotini, Drama, Philippi, Avdira, and Thessaloniki, there are currently no artifacts in any of them that could be associated with the moldboard plow.<sup>27</sup> How can that be explained? What would cause the inhabitants of an area like Thrace to search for technological improvements for their agricultural practices, while their neighbors inhabiting the adjacent area would seem content to stick resolutely to traditional means? The answer is twofold and it is suggested by both the current state of research and by the microregional climatic and soil differences in the provinces of the Byzantine Empire.

In Greece, despite the heavy domination of shallow cambisols and calcisols (fifty percent of the soil coverage), in the northern part of the country, that is, western Thrace and Macedonia, there are small enclaves of vertisols (four percent) and fairly significant areas covered by fluvisols (twenty-four percent), both suitable for tilling with a plow.<sup>28</sup> It must be noted, however, that the majority of the archaeological museums and their

collections in northern Greece, where the greatest concentration of vertisols and fluvisols is located, are quite new. The archaeological museum of Didymoteichon, for instance, was inaugurated in 2013, and that of Alexandroupolis in 2018. The museums in Drama and Advira are not that old either, having opened in 1999 and 2000, respectively. Similarly, in the areas saturated by vertisols, namely, the Turkish part of Thrace, there are only two museums with archaeological divisions, combined with ethnographic departments: Edirne and Tekirdağ.<sup>29</sup> Both museums host some Byzantine artifacts, but as their collections are heavily focused on earlier periods and neither has a Byzantine department or specialists in Byzantine archaeology, the lack of specimens related to Byzantine farming is of little surprise. These factors clearly explain why the profusion of finds of asymmetric plowshares from the Bulgarian part of the Tundzha River valley, through which the road from Constantinople to Dristra (Silistra) on the Danube passed (including the towns of Kabile, Karavelovo, and Voden), ends at the political border between Bulgaria and Turkey, despite the fact that the same soil and climatic conditions existed on both sides.<sup>30</sup>

Indeed, surviving wills and monastic *praktika* betray the existence of iron shares in the Byzantine lands inherited by Greece and Turkey.<sup>31</sup> However, whether they belonged to the ancient ard, as does the specimen dug out from the late-fourteenth- to early-fifteenth-century village on the top of ancient Panakton, near Athens,<sup>32</sup> or to the moldboard plow, remains unknown. An interesting piece of information comes from Methone, in the Morea, where in 1336 a commercial transaction registered the sale of 300 iron shares imported from Venice.<sup>33</sup> Despite the lack of specific information as to the type of those shares, such an

26 Henning, *Südosteuropa*, 51, fig. 19.

27 My research was financed by the American Research Center in Sofia during my postdoctoral fellowship in 2014–15, and continued in subsequent years.

28 European Commission, *Soil Atlas of Europe* (Luxembourg, 2005), 70–72.

29 The museum of Kırklareli combines natural history, ethnography, and archaeology. It has very few specimens of the Byzantine period, mainly coins and pottery.

30 See 9, 11, and 28 in the catalogue and fig. 3, below.

31 See, e.g., the “Melissenos Will,” MM 4:267–71; see also the will of Kalana Spelianitopoulos in F. Uspenskii and V. Beneshevich, eds., *Vazelonskie Akty: Actes de Bazelon* (Leningrad, 1929), no. 118.

32 S. E. J. Gerstel, M. Munn, H. E. Grossman, E. Barnes, A. H. Rohn, and M. Kiel, “A Late Medieval Settlement at Panakton,” *Hesperia* 72.2 (2003): 147–234, at 165.

33 A. Nanetti, ed, *Documenta veneta Coroni & Methoni rogata: Euristicia e critica documentaria per gli “oculi capitales Communis Veneciarum” (secoli XIV e XV)*, 2 vols. (Athens, 2007), 2:113–14.

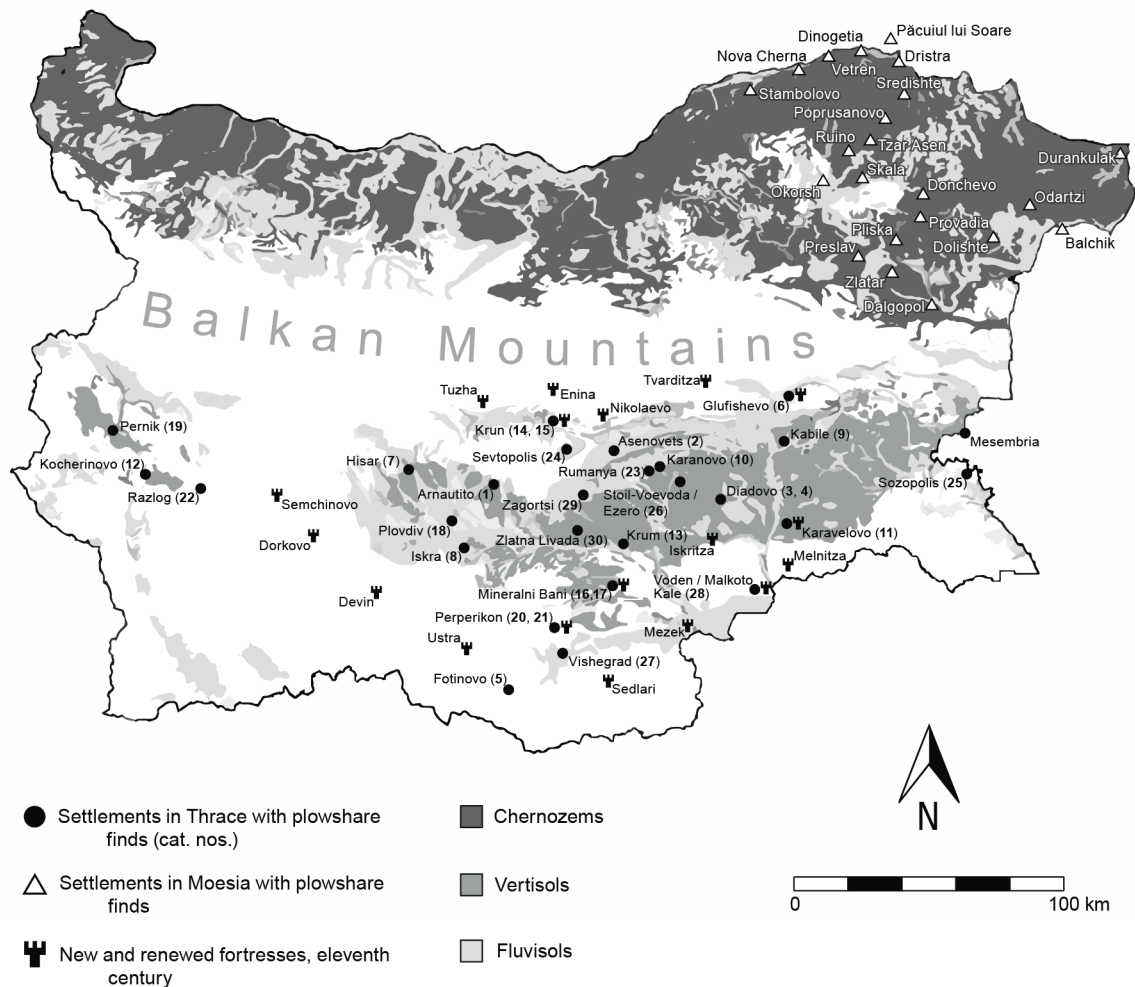


Fig. 3. Locations of finds of asymmetric plowshares in the territory of modern Bulgaria. After S. Petrova, “Soil Characteristics in the Region of Sarnena Sredna Gora Mountains (Southern Bulgaria),” *ZooNotes* suppl. 9 (2020), 20–27, at 22, fig. 4; courtesy of the Soil Institute of Bulgaria.

import in bulk undoubtedly indicates that there was an inadequate supply of locally produced shares for the needs of tillage in the Morea. Was this due to deficient ironmongery, as suggested by Michael Choniates’ complaint that in Athens there were no smithies where one could buy a knife?<sup>34</sup> Or should one trust that the late Byzantine illustrations of plowshares in the aforementioned copy of Hesiod’s *Works and Days* were indeed accurate in depicting shares unsuitable for tilling the Venetian estates in Morea? Certainly, local evidence should be taken seriously, but not as a comprehensive

explanation for the technological aspects of Byzantine agriculture in general. In the tenth-century *Geoponika*, a compendium of agricultural information, an interesting passage evokes the image of a heavy plow. “It is necessary,” the author advises, “that the plowman yoke not two but four oxen . . . and use a heavier (βαρυτέρα) plowshare, so that in this way the richness of the earth might be worked deep and turned over.”<sup>35</sup> Although the

34 See M. Angold, *The Byzantine Empire, 1025–1204: A Political History* (London, 1984), 249.

35 *Geoponika* B.23.14: ἀροῦντα δὲ οὐ δύο, τέσσαρας δὲ βόας ὑποζευγνύνει χρῆ, καὶ ποιεῖν τὴν καλουμένην διζυρίαν· δευτεροῦν δὲ καὶ τριτοῦν, ὅναι τε χρῆσθαι βαρυτέρα, ἵν’ οὕτως τὸ λιπαρὸν τῆς γῆς βαρυεργηθῇ καὶ βωλοστροφῇ. All translations are the author’s. For the text, see H. Beckh, *Geoponika sive Cassiani Bassi scholastici de re rustica eclogue* (Lipsiae, 1895), 65; for another translation, see



*Geoponika* is known as a compilation of ancient sources, curiously, this passage strikingly resembles the agricultural realities of tenth- to eleventh-century Thrace and Moesia, as revealed by archaeological excavations.

In contrast to the situation in Greece and Turkey, Bulgarian archaeological museums host rich data for the use of plows. Figure 3 shows the findspots of asymmetric plowshares in Bulgaria overlaid on a map of the soil types under discussion; the catalogue at the end of this study presents the plowshares found in Bulgarian Thrace. Besides climatic and soil conditions, the number of museums that emerged during the years of the communist regime is responsible for the contrast between the numbers of plowshares found in Bulgaria as compared to Greece and Turkey. Using history as an ideological weapon and archaeology as a legitimator of history, the regime's desire for an ideological "education of the masses" resulted in the establishment of an impressive network of provincial museums. Not only did a regional archaeological museum appear in every district center, but also every county museum now had an archaeological department. By the late 1970s, the exotic charm of archaeology, combined with looser ideological control within the field, had supplied a relatively large number of young specialists to provincial museums. Thus, while in Turkey's part of Thrace today there are only two museums with archaeological collections (Edirne and Tekirdağ), neither with a Byzantine section, in the Bulgarian part of Thrace (which is of almost the same size), there are more than twenty-five regional and local museums, all with archaeological departments and specialists from prehistory to the late Middle Ages. Reserving promising archaeological sites of "national and class importance" for party favorites from the central archaeological institutes, the regime delegated to those provincial archaeologists the tasks of general surveys, local salvage projects, and the investigation of rural sites of "local importance." The results of those studies rarely if ever made it into national archaeological periodicals, but became the bread and butter of regional and local publications. Under strict policies for recording, analyzing, and storing artifacts, this cohort of provincial specialists built a rich and detailed corpus of archaeological data uncontaminated by ideological clichés. It is on the basis of their efforts that it is now

possible to reconstruct the agricultural practices of medieval Thrace.

## The Human Factor

The most important variable that turned the fertile soils of Thrace into a site of agricultural production was the human factor. Thrace became the granary of Constantinople only after the repopulation of the region that started in the eleventh century. Both historical sources and the numismatic material pertaining to the eighth and ninth centuries attest that despite earlier attempts of Constantinople to repopulate Thrace, as a prime zone of continuous Bulgar-Byzantine conflicts it remained largely deserted.<sup>36</sup> "Refugees and aliens" were settled there in 807 by the order of Emperor Nikephoros I Genikos, and *stratiotai* from all the themes were ordered to sell their possessions and to move to those lands, only to abandon them a few years later when the Bulgar ruler Krum launched his campaign against the empire in Thrace.<sup>37</sup> A few "islands" remained in and around the ancient cities of Philippopolis, Beroia, and Develtus, as well as in the Black Sea coastal towns of Mesembria, Anchialos, Sozopolis, and Agatopolis. There were also a few fortified settlements along the Maritsa River, such as Adrianople (Edirne, Turkey), Didymoteichon (near Didymoticho, Greece), and Constantia (Simeonovgrad, Bulgaria).<sup>38</sup> A new period in the demographic history of Thrace began in 864, after the so-called eternal peace was concluded between Byzantium and the Bulgars. The treaty confirmed the appropriation of Thracian lands north of the line between Develtus and Constantia to Bulgaria, as had been agreed in an earlier pact between Krum and Emperor Leo V in 816. The repopulation that followed was duly noted by Pseudo-Symeon Magister's *Chronographia*<sup>39</sup> and confirmed by

36 Good synopsis and bibliography about the historical geography of Thrace is offered by Soustal, *Tabula Imperii Byzantini*, vol. 6; and Külzer, *Tabula Imperii Byzantini*, vol. 12.

37 P. Sophoulis, *Byzantium and Bulgaria, 775–831* (Leiden, 2011), 17–18.

38 B. Borisov, "Settlements of Northeastern Thrace: 11th–12th Centuries," *Archaeologia Bulgarica* 5.2 (2001): 77–92.

39 I. Bekker, ed., *Theophanes continuatus, Ioannes Cameniata, Symeon Magister, Georgius Monachus*, CSHB 45 (Bonn, 1838), 657; the author referred to in Bekker's edition as Symeon Magister is now

T. Owen, trans., *Γεωπονικά: Agricultural Pursuits*, 2 vols. (London, 1805–6), 1:73.

archaeological evidence.<sup>40</sup> However, no traces of a new tilling device are evident in this period. The peaceful period following the Byzantine–Bulgarian wars of the first decades of the tenth century resulted in the establishment of some settlements in Thrace, such as those discovered near the modern villages of Znamenosets, Iskritsa, and Polski Gradets. All of these were abandoned in the late tenth century due to the Magyar invasion of 962, Sviatoslav's pillaging of the area in 970, or the war with Samuel that started in 976 and lasted until the complete subjugation of Bulgaria in 1018.<sup>41</sup> Paulicians were also settled by Emperor John Tzimiskes in Philippopolis, which had been devastated by the Rus in 971,<sup>42</sup> but when the war with Samuel broke out, access was limited to the Thracian lands on the outskirts of Constantinople. None of these abortive attempts to resettle Thrace were associated with the introduction of the plow. The great economic potential of the region as a whole became apparent only after the final Byzantine conquest of Bulgaria in 1018, particularly after the first quarter of the eleventh century, which witnessed a significant growth of new settlements in Thrace. The new settlements materialized as a result of the relocation of the Moesian population, which had escaped the devastating raids of the Pechenegs in the lands north of the Balkan Mountains (also known as the Stara Planina range or Haemus). It was this population that introduced the moldboard plow to the clay soils of Thrace.

Following the introduction of the moldboard plow, the plentiful grain produced in Thrace was directed not only to the markets of Constantinople, but also outside the empire, as a commodity exported by Italian merchants. In the 1330s or 1340s, the Florentine

merchant Francesco Pegolotti ranked the wheat from the environs of Rodosto (Tekirdağ, Turkey) as “the best of Romania,” followed by that from the hinterland of the Black Sea town of Sozopolis (Sozopol, Bulgaria).<sup>43</sup> The two towns delineated the southernmost and easternmost bounds of Thracian grain production.

## The Moesian Connection

The re-establishment in ca. 1000 of Byzantine rule in Moesia, which had been temporarily lost to Samuel in the previous decade or so, placed the region under the military command of a duke, or *katepano*, a commander of professional soldiers organized in units (*tagmata*) dispatched from the central army. Nonetheless, Byzantine authority in the region relied on the support of the local elites as well. That authority was based in the local fortresses, inhabited now by both the Byzantine garrisons and the local population, which manned the ramparts.<sup>44</sup> Both written sources and archaeological evidence confirm this cohabitation. The efforts of Basil II to seal the annexation of Bulgarian territories through intermarriages of Bulgarian and Byzantine nobility, as witnessed by Yahya ibn Sa'id al-Anṭākī (Yahya of Antioch),<sup>45</sup> could have hardly been limited to the aristocracy, and Basil's efforts also must have included the conscription of Bulgarian military personnel in the Byzantine forces. Just like Samuel, who enlisted Byzantine captives to serve in his army, Basil II used Bulgarian soldiers in his campaigns in the

known as Pseudo-Simeon. See A. Kazhdan, “Symeon Magistros, Pseudo-,” *ODB* 3:1983.

40 Borisov, “Settlements”; idem, *Keramika i keramichno proizvodstvo prez XI–XII vek ot teritorijata na dнешna yugoiztochna Bulgaria* (Radnevo, 2002), 226–28; K. Stanev, “Monetnata tsirkulacia v ranosrednovekovna Trakia, nachaloto na VII–nachaloto na IX vek,” in *Istorikii 4: Nauchni izsledvania v chest na profesor Ivan Karajotov po sluchaj negovata 70-godishinina*, ed. I. Iordanov, R. Angelova, R. Angelova, K. Konstantinov, and T. Todorov (Shumen, 2011), 115–31.

41 Borisov, “Demographic and Ethnic Changes during XI–XII Century in Bulgaria,” *Archaeologia Bulgarica* 11.2 (2007): 71–84.

42 H. Thurn, ed., *Ioannis Scylitzae Synopsis Historiarum*, CFHB 5 (Berlin, 1973), 286; J. Wortley, ed. and trans., *John Skylitzes: A Synopsis of Byzantine History, 811–1057* (Cambridge, 2010), 273–74.

43 *La pratica della mercatura*, trans. A. Evans (Cambridge, MA, 1936), 42.

44 This practice is well known; see G. Dagron and H. Mihăescu, *Le traité sur la guérilla (De velitatione) de l'empereur Nicéphore Phocas (963–969)* (Paris, 1986), 254–57; J. Haldon, “Military Service, Military Lands, and the Status of Soldiers: Current Problems and Interpretations,” *DOP* 47 (1993): 1–67, at 57; and N. Oikonomides, “L'évolution de l'organisation administrative de l'empire byzantin au XI<sup>e</sup> siècle (1025–1118),” *TM* 6 (1976): 126–52.

45 V. R. Rozen, *Imperator Vasilii Bolgaroboica: Izvlecheniia iz letopisi Iakh'ia Antiokhiiskogo* (St. Petersburg, 1883; repr. London, 1972), 59. The history of Yahya ibn Sa'id al-Anṭākī is published in three parts: I. Kratchkovsky and A. A. Vasiliev, “Histoire de Yahya-Ibn-Sa'id d'Antioche, Continuateur de Sa'id-Ibn-Bitriq,” *PO* 18.5 (1924): 699–833 and *PO* 23.3 (1932): 349–520; F. Micheau and G. Troupeau, “Histoire de Yahya-Ibn-Sa'id d'Antioche, Continuateur de Sa'id-Ibn-Bitriq,” *PO* 47.4 (1997): 374–559 (see 406–7 for the intermarriages of Bulgarian and Byzantine nobility). See also J. H. Forsyth, “The Byzantine-Arab Chronicle (938–1034) of Yahya b. Sa'id al-Anṭaki” (PhD diss., University of Michigan, Ann Arbor, 1977).



east (for example, in 995), while still waging war against Samuel in the west.<sup>46</sup>

Single silver coins (*miliaresia*) of John Tzimiskes associated with army payments come from the fortresses of Constantia, Dervent, Dristra, Oltina, Păcuilui Soare, Pliska, Preslav, Shumen, Skala, Valul lui Traian, Varna, and Vetren, and indicate the establishment and consolidation of Byzantine power in Moesia after 971.<sup>47</sup> Both the sunken-floored, civilian dwellings of local recruits and the large, stone-walled buildings of the Byzantine administration and its military personnel occupied intramural space in Dristra, Okorsh, Ruino, Skala, Sredishte, and Tsar Asen, as well as the fort near Odarci, and these sites all produced anonymous folles of class A2 (976–1028).<sup>48</sup> Those coins signal either the withdrawal of the Byzantine garrisons and the return of the local population after 989–990, when Samuel gained an upper hand in his war with Basil II, or the continuous cohabitation of the two populations within the walls even after the Byzantine conquest.

Other evidence suggests cohabitation. Sherds of high quality, white-clay pottery and monochrome-glazed wares of green or yellow-green color of Byzantine origin,<sup>49</sup> as well as of pots thrown on a tournette (a

slowly moving wheel) with combed and burnished ornaments, typical for early medieval Bulgaria, have been found together on the fortified sites at Dristra, Păcuilui Soare, Pliska, Preslav, Skala, and Tsar Asen.<sup>50</sup> Some of the remains of pottery thrown on a tournette are decorated with the sign of an upsilon between two bars (|Y|)—an apotropaic sign which appears on different media, including stone, bone, and ceramics, in assemblages dated to the eighth and especially ninth century in Bulgaria.<sup>51</sup> There are also graffiti and amulets with Cyrillic inscriptions that clearly postdate the Byzantine conquest.<sup>52</sup>

After the temporary restoration of Bulgarian authority in 989–990 and the subsequent return of Byzantine rule in 1000, Moesia experienced a short period of tranquility. The peace came to an end in 1027, when the Pechenegs crossed the Danube somewhere west of Vidin and pillaged the region as far south as Naissus, thus opening a long period of devastating raids that deeply affected the demographic situation of the region.<sup>53</sup> The first Pecheneg raids on the Balkans might be dated with caution to the 940s, as suggested by some interpretations of the Cyrillic inscriptions from Mircea Vodă.<sup>54</sup> More securely, however, they should be associated with the improvement of the defenses on the southern border of the Principality of Kiev in the late tenth century, improvements which compelled the Pechenegs to look for new

46 W. Xylander, ed., *Georgii Cedreni Compendium historiarum* (Paris, 1647), 643, 648; for the recruitment of Byzantines in the army of Samuel, see Wortley, *John Skylitzes*, 313. For the Bulgarians in service of the Byzantine forces in the campaign of Basil II alleviating Aleppo in 995, see Rozen, *Imperator Vasilii Bolgaroboica*, 33, and Kratchkovsky and Vasiliev, “Histoire de Yahya-Ibn-Said,” *PO* 23.3: 443.

47 I. Valeriev, “Kum istoriata i archaeologiatata na zemite ot dolnia Dunav: Sbornite monetni nahodki ot teritoriata na Bulgaria, Serbia i Romania (969–1180),” *Dobrudzha* 24–25 (2013): 381–460; see also A. Madgearu, *Byzantine Military Organization on the Danube, 10th–12th Centuries* (Leiden, 2013), 101.

48 According to C. Morrisson, *Catalogue des monnaies byzantines de la Bibliothèque Nationale*, vol. 2, *De Philippicus à Alexis III (711–1204)* (Paris, 1970), 596–600. However, the precise dating of A2 folles remains a matter of debate. According to Philip Grierson (*DOC* 3:635–45), folles A2 are dated 976–1030/35. According to D. M. Metcalf (*Coinage in South-Eastern Europe, 820–1396* [London, 1979], 55–62), A2 folles were minted 989–1034. Metcalf, however, identifies another type of follis, A3, the minting of which started around 1020, and which has a significantly lower weight (9–10 gr.) than A2 (16–20 gr.).

49 Byzantine monochrome- and polychrome-glazed pottery differ from sgraffito pottery and appear as early as the ninth century. For details, see G. D. R. Sanders, “Byzantine Polychrome Pottery,” in *Mosaic: Festschrift for A. H. S. Megaw*, ed. J. Herrin, M. Mullett, and C. Otten-Froux, *British School at Athens Studies* 8 (2001), 89–103.

50 Iotov and Atanasov, *Skala*, 64–76; D. Dimitrov, “Keramikata ot rannosednovekovnata krepost do selo Tzar Asen” *Dobrudzha* 10 (1993): 76–105; L. Doncheva-Petkova, “Dobrudzha prez X i XI vek,” in *Bulgarskite zemi prez Srednovekovieto (VII–XVIII v)*, ed. V. Iotov and V. Pavlova (Varna, 2005), 63–72; C. Paraschiv-Talmaçchi, “Early Medieval Glazed Ceramics Discovered in the Fortifications from Hârşova and Oltina (South-Eastern Romania),” in *Polivnya keramika Sredizemnomoria Prichernomoria X–XVIII vek*, ed. S. Bocharov, V. François, and A. Sitdikov, 2 vols. (Kazan, 2017), 2:271–86.

51 E. Tryjarski, “Alte und neue Probleme der runenartigen Inschriften Europas: Ein Versuch der Entzifferung der Texte aus Murfatlar und Pliska,” in *Runen, Tamgas und Graffiti aus Asian und Osteuropa*, ed. K. Röhrborn and W. Veenker (Wiesbaden, 1985), 53–80.

52 Doncheva-Petkova, “Dobrudzha,” 65; Iotov and Atanasov, *Skala*, 27.

53 Thurn, *Ioannis Scylitzae Synopsis Historiarum*, 373; G. Atanasov, “Anonimnye vizantiiskie follisy klasa B i nashestvie pechenegov v Dobrudzhu 1036 g.,” *Stratum+* 6 (1999): 111–22; Stephenson, *Byzantium's Balkan Frontier*, 80–100.

54 A. Paroń, *Pieczynowie: Koczownicy w krajobrazie politycznym i kulturowym średniowiecznej Europy* (Wrocław, 2015).

sources of booty.<sup>55</sup> After the Pechenegs settled on the northern bank of the Danube the entire lower Danube region became their target of plunder. Defeated and temporarily discouraged by Constantine Diogenes in 1027, the Pechenegs renewed their raids from 1032 to 1036, when they ravaged the theme of Bulgaria, reaching as far south as Thessaloniki, and laid waste to Thrace and Macedonia.<sup>56</sup> The west–east direction of the Pecheneg attacks is considered to have been a strategic move to acquire booty by avoiding the strong defense line along the lower Danube, from Dristra to the west, through Păcuilui lui Soare and Capidava, to Dinogetia (Garvan) and Isaccea at the Danube delta to the northeast.<sup>57</sup>

Despite some variations, there is a consensus that Pecheneg attacks on Moesia produced both a shift in imperial defensive policy and critical demographic changes in the region.<sup>58</sup> The incursions of 1032–36 seem to have reached catastrophic proportions as they compelled the Byzantine administration to transfer the Moesian population to the lands south of the Balkan Mountains and to turn the region into a depopulated buffer zone that was supposed to hinder the Pechenegs. As they would not be able to find supplies locally, the Pechenegs would become more hesitant to raid lands farther to the south. In the aftermath of the conflict between the Pecheneg chieftains Kegen and Tyrach, which spilled over into imperial territory in 1045, the entire imperial defensive line withdrew south of the Balkan Mountains, leaving to the Pechenegs an almost autonomous territory immediately south of the Danube.<sup>59</sup> Byzantine rule in Moesia was restored only

after Alexius Comnenus's victory over the Pechenegs in 1091. The demographic recovery of the region, however, took much longer.

The scale of demographic change caused by the Pecheneg incursions from 1032–1036 is well attested by the layers of destruction in settlements and by coin and pottery data coming from Dobrudzha, or Scythia Minor, as it was known to the Byzantines. Out of fifty-six archaeologically surveyed settlements in the vicinity of the old Bulgarian capital, Pliska, only three survived the Pecheneg incursions.<sup>60</sup> A similar scale of devastation is recorded in the district of Ruse, on the southern bank of the Danube, where out of forty-one surveyed settlements and two hillforts, only four survived the attacks of the Pechenegs; and in the district of Dristra, where only three out of seventy-two settlements and eight hillforts continued to exist after the Pecheneg invasions.<sup>61</sup> Archaeological investigations in the fortresses and settlements from the interior of Dobrudzha have revealed destruction levels dated by folles of class B, after which life in these settlements ended.<sup>62</sup> While the habitation of heavily fortified sites such as Dinogetia, Dristra, Păcuilui lui Soare, and Preslav continued into the second half of the eleventh century, the interior of Dobrudzha, as illustrated by the archaeological data coming from fifty fortresses and 250 settlements, was completely depopulated.<sup>63</sup>

A similar degree of destruction is documented archaeologically in western Moesia, the area between the Ogosta and Tsibritsa rivers, where one archaeological survey reports that out of ten medieval settlements only one survived the Pecheneg incursions.<sup>64</sup> The fortresses and the settlements near the present-day villages

55 S. H. Cross and O. P. Sherbowitz-Wetzor, ed. and trans., *The Russian Primary Chronicle: Laurentian Text* (Cambridge, MA, 1953), 119.

56 C. Holmes, *Basil II and the Governance of Empire (976–1025)* (Oxford, 2005), 415; A. Madgearu, *Byzantine Military Organization*, 58–87; P. Stephenson, *Byzantium's Balkan Frontier: A Political Study of the Northern Balkans, 900–1204* (Cambridge, 2004), 81.

57 G. Atanasov, "Anonimnye vizantiiskie folliis klasa B," 111–22; P. Diaconu, *Les Petchénègues au Bas-Danube, éd. de l'Académie de la R. S. de Roumanie* (Bucarest, 1970), 22–24, 34–38.

58 Atanasov, "Anonimnye," 116; Madgearu, *Byzantine Military Organization*, 120–23; Stephenson, *Byzantium's Balkan Frontier*, 89–103; J. Haldon, *Warfare, State and Society in the Byzantine World, 565–1204* (London, 1999), 63–64, 93–94.

59 Thurn, *Ioannis Scylitzae Synopsis Historiarum*, 459; Borisov, "Demographic and Ethnic Changes," 71–85; Stephenson, *Byzantium's Balkan Frontier*, 80–100.

60 T. Balabanov, "Novootkriti rannosrednovekovni selishta v okolnostite na Pliska," in *Problemi na prabulgarskata istoria i kultura: Mezhdunarodna sresha po prabulgarska arheologija, Shumen, 1986* (Sofia, 1989), 151.

61 R. Rashev, K. Apostolov, G. Aatanasov, S. Bonev, G. Dzanev, V. Iotov, A. Konakliev, V. Petrova, V. Pletnirov, and D. Stanchev, "Materiali za kartata na srednovekovna Bulgaria," *Pliska–Preslav* 7 (1995): 155–332.

62 G. Atanasov, "Nov pogled kum demografskite i etnokulturnite promeni v Dobrudzha prez srednovekovieto," *Studia Balcanica* 23, *Izsledvanija v chest na profesor Strašimir Dimitrov* (2001): 185–214.

63 Ibid.

64 Z. Vazharova, "Srednovekovni obekti po dolinite na rekite Tzibritza i Ogosta," *Izvestia na Arheologicheskia Institut* 28 (1965): 231–46.



of Gigen (in the district of Pleven), Lilyache, Staro Selo (in Vratsa), and Vrav (in Vidin) were also abandoned.<sup>65</sup> The finds of hoards containing folles of classes A and B from Bezhanovo, Chavdarts, and Sadovets in central Moesia confirm that the abandonment of the region followed the Pecheneg raids in 1032.<sup>66</sup> It is therefore of no surprise that over one hundred years later, in 1148, John Cinnamus described the Moesian plains as good hunting fields where “a great quantity of wild beasts dwell in herds . . . since it has been entirely deserted for many years.”<sup>67</sup>

The Pecheneg raids were responsible for the concealment of numerous hoards of farm tools and weapons, which in turn have produced secure archaeological evidence for the use of the moldboard plow in Moesia. The asymmetric plowshares from Preslav and Pliska, as well as from the fortresses along the road from Preslav to Dristra (Sredishte, Tsar Asen, Okorsh, Ruino, and Poprusanovo), are from assemblages dated with anonymous folles of class A2. Those coins indicate a date of concealment at the time folles of class A2 were still in circulation and readily available, that is, sometime within or soon after 976–1028.<sup>68</sup>

The case of the fortress of Skala (near the modern village of Kladentsi) is revealing for the demographic changes in the region. Extensive and thorough excavations of the site have shown that the fortress was

built shortly before 900 CE (as indicated by a coin of Leo VI found under the foundation of the ramparts), most likely as a response to the Magyar incursions into Bulgaria.<sup>69</sup> While coins dated to the first century of the fortress’s existence are rare, the Byzantine conquest of 971 is signaled by no less than eight folles of class A1 (971–976) found outside the abandoned sunken-floored dwellings. The abundance of folles of class A2 (more than 280), the restoration of the ramparts, the appearance of above-ground dwellings and pottery made on the fast wheel, and the reoccupation of the sunken-floored buildings all suggest that a local population of thirty-five households and the Byzantine garrison lived together in the fortress in the early eleventh century. An asymmetric plowshare was found in one of the sunken-floored dwellings along with a follis of class A2. The end of occupation at Skala is marked by twenty-four folles of class B (1028–1034)<sup>70</sup> found in a destruction layer, which suggests that it may have been caused by the Pecheneg onslaught of 1036.<sup>71</sup> The asymmetric plowshare from Skala could be attributed either to the local population of Moesia or to the Byzantine garrison. The latter possibility can be easily eliminated, however, as nowhere else in the Byzantine Empire have asymmetric plowshares been found.

On the other hand, evidence for the local use of asymmetric plowshares is quite solid. No coins can secure the dating of the moldboard plow being used in Bulgaria before Sviatoslav’s invasion of 969–970.<sup>72</sup> One asymmetric plowshare of quite small size (16 × 9 cm) was found in the debris of a collapsed wall near the eastern gate of the inner town along with remains of Bulgar gray ware with burnished decoration.<sup>73</sup> Whether the ruined wall should be attributed to the capture of Pliska by John Tzimiskes in 971 or to the

65 Ibid.; K. Stanev, “Migratsia na bulgari prez 30-te g. na XI v. ot Severna Bulgaria kum zapadnite bulgarski zemi: Nov pogled kum predistorijata na vustanieto na Petar Delian,” *Minalo* 3 (2004): 38–46.

66 For Bezhanovo see T. Gerasimov, “Kolektivni nahodki na moneti prez 1937 i 1938,” *Izvestia na Bulgarskia Arheologicheski Institut* 12 (1939): 450–57; for Chavdarts (formerly Lazhane), see idem, “Kolektivni nahodki na moneti prez 1934, 1935 i 1936,” *Izvestia na Bulgarskia Arheologicheski Institut* 11 (1937): 315–24, at 318; for Sadovets, see E. Oberländer-Tärnoveanu, “La monnaie dans l’espace rural byzantine des Balkans orientaux: Un essai de synthèse au commencement du XXI<sup>e</sup> siècle,” *Peuce* 1 (2003): 341–412, at 392, no. 426.

67 *Histories* 50.3: συμβαίνει γὰρ αὐταῖς ἅτε ἐρήμοις παντάπασι καὶ οἰκίτοις ἐκ παλαιοῦ προκειμέναις ἀγέληδὸν ἀγρίων τι χρῆμα ζῶων ἐντρέφεισθαι (A. Meineke, ed., *Ioannis Cinnami epitome rerum ab Joanne et Alexio Comnenis gestarum* [Bonn, 1836], 93).

68 G. Mănușcu-Adameșteanu, “Les invasions des Petchénègues au Bas Danube,” in *Numismatici i sfragistici prinosi kām istoriata na zapadnoto Chernomorie: Mezhdunarodna konferenciia, Varna, 12–15 Septemvri 2001 g.* / *Numismatic, Sphragistic and Epigraphic Contributions to the History of the Black Sea Coast: International Conference, Varna, September 12th–15th, 2001*, ed. V. Iotov and I. Lazarenko (Varna, 2004), 299–311.

69 Iotov and Atanasov, *Skala*, 18.

70 According to D. M. Metcalf (*Coinage in South-Eastern Europe*, 58, 62–63) and Cécile Morrisson (*Catalogue des monnaies byzantines*, 596–600). Grierson (*Catalogue of the Byzantine Coins*, 639) dates the folles of class B to 1030/35–1042.

71 Iotov and Atanasov, *Skala*, 124–37.

72 Because the First Bulgarian Empire had a largely non-monetary economy, coin finds are rare. For instance, there are only 36 coins found in Pliska for the entire period from 802 to 968, of which 15 are gold coins found in a hoard concealed on the eve of Sviatoslav’s invasion.

73 T. Balabanov, “Zemedelski orudia ot Pliska (IX–XI v.),” *Bulgarska etnologiya* 2 (1985): 19–29.

campaign of Theodorokanos and Xiphias in 1000 remains debatable.<sup>74</sup> What is beyond doubt, however, is that this asymmetric plowshare was used by the dwellers of Pliska *before* the destruction of the wall, that is, it can be safely dated to the tenth century. However, the situation on the field, that is, the ceramic material associated with the finds of plowshares, and graffiti showing moldboard plows in Pliska suggest that such implements were known well before the Rus invasion.

Drawings of tilling devices have been found in several places in Pliska. An incised drawing of an ard is found on a brick from the ruined southern wall; another on a stone from the chapel of the Little Palace.<sup>75</sup> More importantly, drawings of plows with a coulter and moldboard appear on a stone of the northern wall, close to the northern gate, as well as on a stone from the wall of the chapel of the Little Palace.<sup>76</sup> Both drawings were likely made before the destruction of the structures that used the stones.

Another asymmetric plowshare (23.5 × 14.0 cm) was found near the northern wall of the outer town in Pliska, and two more were in a hoard of farm implements retrieved in the ruins of the so-called Palace of Krum.<sup>77</sup> Besides two plowshares, four sickles, a goad, and an adze, the assemblage included a follis of the A2 class, which suggests that the hoard was buried in the eve of, or during, the Pecheneg raids of the 1030s.<sup>78</sup> Six more asymmetric plowshares were found outside the citadel at Pliska in two other hoards of farm implements and weapons, each with three asymmetric plowshares of Henning's class A1.<sup>79</sup> No less than fourteen asymmetric plowshares from four different hoards of farm implements have been also found in Preslav, and

they have been dated to the same time as those found in Pliska.<sup>80</sup>

Found singly or in hoards, asymmetric plowshares are also known from the Moesian sites of Dalgopol,<sup>81</sup> Dolishte,<sup>82</sup> Donchevo,<sup>83</sup> Dristra,<sup>84</sup> Durankulak,<sup>85</sup> Nova Cherna,<sup>86</sup> Odartzi,<sup>87</sup> Provadia,<sup>88</sup> Sredishte,<sup>89</sup> Ruino, Tzar Asen, Okorsh, Poprusanovo, Stambolovo,<sup>90</sup> Sturmen,<sup>91</sup> and Zlatar<sup>92</sup> (see Fig. 3), and just outside the modern Bulgarian border, Capidava,<sup>93</sup> Dinogetia

74 Leo the Deacon (C. B. Hase, ed., *Leonis Diaconi Caloënsis Historiae Libri* [Bonn, 1828], 138) reports the sack of Pliska by Emperor John Tzimiskes in 971; John Skylitzes (Thurn, *Ioannis Scylitzae Synopsis Historiarum*, 343–44) describes the capture of Pliska by Theodorokanos and Xiphias in 1000.

75 D. Ovcharov, "Izobrazhenia na rala varkhu risunki-grafti ot Pliska (VIII–X v.)," *Vekove* 1 (1980): 41–47.

76 Ibid. figs. 3, 4 and 6.

77 Ibid.

78 Ibid.

79 V. Antonova, "Novootkrita nahodka ot zemedelski sechiva pri Pliska," *Preslav: Sbornik* 4 (1983): 263–69; Vitliyanov, "Ein Hortfund," 393–402.

80 J. Changova, "Turgovski pomeshtenia kraj yuzhnata krepostna stena v Preslav," *Izvestia na Arheologicheskia Institut* 21 (1957): 233–70; idem, "Srednovekovni orudia na truda v Bulgaria," *Izvestia na Arheologicheskia Institut* 25 (1962): 19–55; idem, "Grazhdanska postroika v m. 'Selishte' v Preslav," *Izvestia na Arheologicheskia Institut* 31 (1969): 211–30; Vitliyanov, "Kolektivna nahodka ot zemedelski," 26–30.

81 D. Zlatarski, "Kolektivna nahodka ot slavianski sechiva ot s. Dalgopol," *Izvestia na Varnenskoto arheologicheskoto druzhestvo* 11 (1960): 103–9.

82 Kouzov, "Find of Medieval Iron Objects."

83 L. Bobcheva, "Orudia na truda ot srednovekovieto v muzeia v Tolbuhin," *Muzei i pametnitsi na kulturata* 12 (1972): 8–12.

84 A hoard of farm implements and weapons was found within the fortress; the plowshares are in the Museum of Silistra, inv. nos. 1084 and 1109.

85 H. Todorova, *Durankulak* (Sofia, 1989), 183.

86 A. Milchev and S. Angelova, "Arheologicheski razkopki i prouchvania v mestnostta 'Kaletu' kraj s. Nova Cherna," *Godishnik na Sofijskia Universitet, Filosofsko Istoricheski Fakultet* 63.3 (1971): 1–113, at 4.

87 L. Doncheva-Petkova, *Odartzi, selishte ot purvo bulgarsko tzarstvo* (Sofia, 1998), 55–56.

88 The piece is Provadia, Historical Museum 513; see Atanasov, "Klady," 184, and V. Antonova, "Novootkrita nahodka ot zemledelski sechiva kraj Pliska," *Preslav* 4 (1983): 263–69.

89 For the hoards of Sredishte, Ruino, Tzar Asen, Okorsh, and Poprusanovo, see G. Atanasov, "Klady zemledel'cheski orudii iz iuzhnoi Dobrudzhi (X–nachalo XI vv.)," *Stratum+* 5 (2000): 183–208.

90 D. Stanchev, "Nakhodka na zhelezni predmeti ot s. Stambolovo, Rusenski okrag," *Godishnik na muzeite ot Severna Bulgaria* 11 (1985): 31–34.

91 S. Mihailov and G. Dzhangov, *Rannosrednovekovnoto selishte pri selo Sturmen*, Razkopki i prouchvania 7 (Sofia, 1982), 52. Two small asymmetric plowshares of the early eleventh century from Sturmen are held by the National Archaeological Institute in Sofia (inv. nos. 4167 and 4225); see below, p. 189.

92 T. Totev, "Kolektivna nahodka ot srednovekovni orudia na truda ot selo Zlatar," *Arheologia* 8.1 (1966): 33–35.

93 G. Florescu, R. Florescu, and P. Diaconu, *Capidava: Monografie arheologică*, Biblioteca de arheologie 2 (Bucharest, 1958), 233, fig. 117.1.

(Garvan),<sup>94</sup> and Păciul lui Soare.<sup>95</sup> All date to the late tenth to early eleventh century and unequivocally demonstrate the utilization of the moldboard plow in the tilling practices of early medieval Bulgaria.<sup>96</sup>

The introduction of this plowing device to Moesia must be seen within the context of broader developments in Central and Eastern Europe. Finds of asymmetric plowshares, coinciding in time with those from late-tenth-century Moesia, come from the heavy chernozem soils of Keszthely-Fenékpuszta, Hungary.<sup>97</sup> However, recent archaeological discoveries of asymmetric and symmetric plowshares used during the last quarter of the first millennium are associated with the agricultural practices of the forest-steppe region north of the Black Sea and the Sea of Azov—that is, the Saltovo-Mayaki culture of the Khazar Khaganate—and with two other cultures to the west, attributed to local Slavic populations: Volyntsevo-Romny, and further to the west, Luka-Raikovetska.<sup>98</sup> It seems like the melting pot of the Khazar Khaganate, made up of Khazars, Onogurs, Pechenegs, Magyars, Alans, and Slavs, produced relatively uniform farming developments, especially in terms of plowing, which transcended ethnic borders and spread all over the forest-steppe region dominated by chernozem soils. The Volyntsevo-Romny culture of left-bank Ukraine has produced so far about a dozen coulter and thirty plowshares (of both symmetrical and asymmetric shape) from eight different sites, while another five coulters and thirteen plowshares are known from sites belonging to the Luka-Raikovetska culture.<sup>99</sup> The appearance

of the asymmetric plowshare in Eastern Europe seemingly must be attributed to the introduction of the plow with unilateral moldboard in the forest-steppe zone north of the Black Sea.

The moldboard plow seems to appear in the forest-steppe zone as an improvement on the old Roman swivel plow. The earliest excavated specimens of symmetric plowshares with the socket-mounting part that belongs to the swivel plow are associated with the chernozems and vertisols of the Roman provinces in the Carpathian Basin, namely, Pannonia and Dacia. Finds are known from sites as far west as Bad Deutsch-Altenburg (Austria),<sup>100</sup> through Budapest<sup>101</sup> and Nemesvámos<sup>102</sup> in central Hungary, to Corvinești,<sup>103</sup> Dextrád,<sup>104</sup> Mărculeni,<sup>105</sup> and Jupa<sup>106</sup> in the easternmost part of the Carpathian Basin. Farther east, this Roman tilling practice spread through the chernozem-rich Wallachian plain, with finds from Gropșani<sup>107</sup> and Surdulești,<sup>108</sup> to reach the area of the fourth-century Sântana de Mureș-Chernyakhov culture, which is saturated with finds of symmetric plowshares.<sup>109</sup>

94 I. Barnea and Ș. Ștefănescu, *Din istoria Dobrogei*, vol. 3, *Bizantini, români și bulgari la Dunărea de Jos* (Bucharest, 1971), 284, fig. 94:1.

95 F. Georgescu, ed., *Muzeul de Istorie al Republicii Socialiste România* (Bucharest, 1975), 46.

96 Iotov and Atanasov, *Skala*, 36–48.

97 Henning, *Südosteuropa*, 53–54.

98 V. Koloda and S. Gorbanenko, *Sil'ske gospodarstvo naselennia khozars'kogo kagantu v lisostepnoviy zoni* (Kiev, 2018), 126–30.

99 Ibid. See also M. Veretjuškina, “Nekotorye aspekty zemledelija slavjanskogo naselenija Besedinskogo arheologičeskogo kompleksa Kurskoj oblasti,” in *Arheologija vostočnoevropejskoj lesostepi: Materialy II-oj Meždunarodnoj naučnoj konferencii. Voronež, 18–20 dekabnja 2015 goda* (Voronezh, 2016), 277–80; idem, “Stanovlenie i razvitie zemledelija slavjan na territorii meždureč'ja Sejma i Psla (po nahodkam nakonečnikov pašennyh orudij),” in *Slavjano-russkie drevnosti Dneprovskogo Levoberež'ja: Materialy konferentsii, posvjashtennoi. 75-letiju so dnja roždenija K.F. Sokola* (Kursk, 2008), 29–34; S. Gorbanenko, “Zemlerobstvo slov'jan ostann'oi

čverti I tis. n. e,” *Arheologija* 3 (2006): 73–79; V. Koloda and S. Gorbanenko, “Zemlerobstvo saltivs'koj kul'turi (za materialami Mohnačans'kogo gorodiša),” *Vita Antiqua* 7–8 (2009): 261–80.

100 R. Pohanka, “Die landwirtschaftlichen Geräte der römischen Kaiserzeit aus Carnuntum,” *Mitteilungen der Gesellschaft der Freunde Carnuntums* 4 (1981): 1–40.

101 M. R. Pető, “Aquincumi ekeletek (Plough Finds from Aquincum),” *Folia Archaeologica* 26 (1975): 93–98.

102 I. Balassa, “The Appearance of the One Sided Plough in the Carpathian Basin,” *Acta Ethnographica Academiae Scientiarum* 20 (1971): 411–37.

103 G. Marinescu and A. Retegan, “Depozitul de obiecte romane de la 1979 Căianul Mic (jud. Bistrița-Năsăud),” *Studii și Cercetări de Istorie Veche* 30.2 (1979): 253–60.

104 I. Glodariu and M. Campeanu, “Depozitul de unelte agricole de la Dextrád (r. Reghin),” *Studii și Cercetări de Istorie Veche* 17 (1966): 19–32.

105 I. Glodariu, A. Zrinyi, and P. Gyulai, “Le dépôt d'outils romains de Mărculeni,” *Dacia* 14 (1970): 207–31.

106 M. Moga and D. Benea, “Unelte agricole romane descoperite la Tibiscum,” *Studii și Comunicări de Etnografie Istorie, Caransebeș* 2 (1977): 321–29.

107 G. Popilian and M. Nica, *Gropșani: Monografie arheologică*, *Bibliotheca thracologica* 24 (Bucharest, 1998), 32–33, 159, 174, figs. 7, 22.

108 I. Spiru, “Așezări străvechi în raionul Roșiori de Vede,” *Materiale și Cercetări Arheologice* 5 (1959): 695–70.

109 I. Ioniță, “Römische Einflüsse im Verbreitungsgebiet der Sântana de Mureș-Černjachov Kultur,” in *Beziehungen des Römischen*



Finds of symmetric plowshares are rare for the period between the fifth and seventh centuries, in both the Carpathian Basin and the Wallachian Plain, but there is an explosion of finds of asymmetric plowshares in the region between the eighth and tenth centuries. Such tools have been found at Pogonești<sup>110</sup> and Mănăstirea<sup>111</sup> (both near Vaslui), on the right bank of the Prut River, as well as from Echimăuți,<sup>112</sup> in the present-day Republic of Moldova. They have also been found in northeastern Dragosloveni<sup>113</sup> and Budești<sup>114</sup> as well as in Bârlogu,<sup>115</sup> in central Wallachia. The presence of the moldboard plow in tenth-century Moesia therefore clearly resembles the tilling practices associated with the chernozems and vertisols north of the Danube and delineates a trajectory of diffusion from the forest-steppe region between the Dniester and the Carpathian Mountains to the east, through the Wallachian Plain and the Carpathian Basin to the west.

To be sure, no finds of symmetric or asymmetric plowshares dated prior to the tenth century are thus far

known from Moesia or Thrace. Henning's distribution map of first- to fourth-century plowshare finds includes a symmetric specimen from the vicinity of a *villa rustica* located on the slope of the Madara Plateau.<sup>116</sup> However, the exact circumstances of the discovery of what would be a very early example are unclear.<sup>117</sup> A symmetric plowshare belonging to a swivel plow was found at Dinogetia (Garvăn) on the Danube and is dated to the late sixth century on the basis of an associated coin struck for Emperor Justinian.<sup>118</sup> Its isolated appearance, however, suggests a connection to the tilling practices of the Wallachian Plain rather than those of the Moesian interior. Henning was misled in many cases into dating symmetric plowshares from Moesia and Thrace between the fifth and the seventh century. A careful analysis of the data reveals that those plowshares were simply misdated. For example, a plowshare from Glufishevo, which Henning dates between the fifth and seventh century, is indeed asymmetric—but it was found within a ceramic pot together with a coin struck for Emperor Alexios III Angelos (r. 1195–1203).<sup>119</sup> A plowshare found in Silistra, inside the Late Roman fortress, in fact appears to be a late tenth-century artifact, when considering the stratigraphy of the find.<sup>120</sup> Isolated finds from Stoil Voevoda and Zagortsi (both in Thrace) are also asymmetric but should be attributed to the eleventh century on a typological basis, as shown below. There are, significantly, no traces of fifth- to seventh-century occupation at either of those sites.<sup>121</sup> All of the other shares that Henning has dated between the fifth and the seventh century belong to ards, not plows. Indeed, they constitute the overwhelming majority of shares dated to that period.<sup>122</sup> Therefore,

*Reiches mit anderen Völkern (I. Bis 4. Jh. u. Z.): Rumänisch–Deutsches Kolloquium (Bukarest, 12–14. April, 1988)*, ed. G. Bodi, Arheologia Moldovei 17 (Bucharest, 1994), 109–16; J. Henning, “Did the ‘Agricultural Revolution’ Go East with Carolingian Conquest? Some Reflections on Early Medieval Rural Economics of the Baiuvarii and Thuringi,” in *The Baiuvarii and Thuringi: An Ethnographic Perspective*, ed. J. Fries-Knoblach, H. Steuer, and J. Hines, Studies in Historical Archaeoethnology 9 (Woodbridge, 2014), 331–59, at 344–45; G. Nikitina, “Zemledelie v chernjahovskoj kul'ture,” *Rossijskaja arheologija* 4 (2006): 41–49; G. Beidin, M. Grigoriants, and M. Liubichev, “Novye nahodki orudii sel'skokoziastvennogo naznacheniia na pamiatnikah chernyakhovskoi kul'tury v Harkovskoi oblasti,” *Drevnosti* 6 (Kharkiv, 2005): 326–30.

110 G. Coman, “Contribuții la cunoașterea fondului etnic al civilizației secolelor V–XIII în jumătatea sudică a Moldovei,” *Carpica* 11 (1979): 181–216, at 187, fig. 1:1.

111 G. Coman, “Cercetări arheologice în sudul Moldovei cu privire la secolele V–XI,” *Studii și Cercetări de Istorie Veche* 20.2 (1969): 287–314, at p. 309, fig. 14, and p. 310, fig. 16.

112 I. Tentiuc, *Populația din Moldova centrală în secolele XI–XIII*, Bibliotheca Archaeologica Iassensis 9 (Iași, 1996), 61, 259, fig. 16:14.

113 M. Comșa and G. Constantinescu, “Depozitul de unelte și arme din epoca feudală timpurie descoperit la Dragosloveni (jud. Vrancea),” *Studii și Cercetări de Istorie Veche* 20.3 (1969): 425–36, at 430, fig. 3:5.

114 A. Paragină and G. Constantinescu, “Descoperiri arheologice din sec. IX–XI pe teritoriul localității Budești (jud. Vrancea),” *Studii și comunicări, Focșani* 3 (1980): 71–87, at 71, 78, figs. 4:3, 12:2.

115 I. Nania, “O importantă descoperire din perioada feudalismului timpuriu la Bîrlogu, comuna Negrași, județul Argeș,” *Studii și comunicări, Pitești* 2 (1969): 117–32, at 123, fig. 2:1.

116 See Henning, *Südosteuropa*, 51, no. 294, fig. 19.

117 R. Popov, “Materiali ot razkopkite prez 1934–35 g.,” *Madara* 2 (1936), 32–97.

118 R. Vulpe and I. Barnea, *Din istoria Dobrogei*, vol. 2, *Romanii: La Dunarea de Jos* (Bucharest, 1968), 495.

119 T. Gerasimov, “Dve nakhodki säs sechiva i oräzhiya ot XII–XIII vek,” *Izvestia na Arheologicheskia Institut* 20 (1955): 590–93.

120 Atanasov, “Za prehoda,” 31.

121 Borisov, “Demographic and Ethnic Changes,” 71–84.

122 There is one other symmetric plowshare, according to Henning (*Südosteuropa*, 145, no. 453): an accidental find from Shabla (on the Bulgarian Black Sea coast), found near the remains of an (allegedly) Roman building and kept in the local school collection for educational purposes. The find, however, is now lost and lacks secure dating or description.

it is safe to conclude that the change in the agricultural practices of Moesia came not at the end of antiquity, but in the tenth century, and must be associated with the inhabitants of the First Bulgarian Empire, who lived in the area and adapted to local climatic conditions and the properties of its heavy loess soil.

### The Pattern in Thrace

The appearance of new settlements in Thrace in the eleventh century, just when populations in Moesia were faced with serious hardships, can hardly be a coincidence. Villages such as those discovered near Asenovets, Diadovo, Ezero, Galabovo, Karavelovo, Kovachevo, Krum, Lyubimets, Yabalkovo, and Zlatna Livada,<sup>123</sup> as well as the villages on the top of the ancient Sevtopolis and Kabile, came into being at the time when Moesia was devastated by Pecheneg raids. Archaeological evidence, in other words, confirms the conclusion that John Haldon, Alexandru Madgearu, and Paul Stephenson reached primarily on the basis of the written sources: that the Moesian population relocated south of the Balkan Mountains, where a new strategic line of defense was established.<sup>124</sup> Numismatic and ceramic data indicate quite clearly that new villages in Thrace appeared shortly before the middle of the eleventh century. In Diadovo, as well as in Znamenets, the earliest coins are folles of classes A2 and B<sup>125</sup> (976–1042, according

to P. Grierson;<sup>126</sup> 989–1034, according to Metcalf;<sup>127</sup> and 976–1034, according to Cécile Morrisson<sup>128</sup>). In the village located on top of ancient Sevtopolis, the earliest coin is a follis of class B.<sup>129</sup> The situation in the fortress of Krun (near the modern city of Kazanlak) is similar to that in Sevtopolis, according to the coin material.<sup>130</sup> Moreover, the latest coins on many sites with traces of destruction in Moesia are also of class B.<sup>131</sup> Even though it is not possible to identify on the basis of coin evidence the exact timing of the mass exodus from the region, it is likely that the emigration took place towards the end of the first half of the eleventh century, at the height of the Pecheneg raids.

An analysis of pottery production from these Thracian villages confirms their relation to the migration wave from Moesia. Besides high-quality Byzantine pottery, more than seventy-five percent of the ceramic remains from the newly established Thracian villages consist of Bulgar gray ware made on a tournette and decorated with burnished ornament. This pottery, typical for the northern parts of early medieval Bulgaria, appeared in Thrace, according to its stratigraphy and associated numismatic data, toward the second half of the eleventh century.<sup>132</sup>

A few villages in Thrace that had been established earlier, perhaps in the first half of the tenth century (including Karanovo, Polski Gradets, the fortress near Iskritsa, and the village on the top of the Roman road station Karasura), saw an increase of population toward the middle of the eleventh century, as signaled

123 For Asenovets, Diadovo, Ezero, and Galabovo, see Borisov, "Demographic and Ethnic Changes"; for Karavelovo, see I. Kraichev, "Arheologicheski razkopki i prouchvabnia na kasnoantichnata i srednovekovna krepost kraï selo Karavelovo, Yabolsko," in *Arheologicheski Otkritia i Razkopki prez 1989* (Sofia, 1990), 112–13; for Kovachevo, see P. Gatev, "Srednovekovno selishte kraï Kovachevo," *Prouchvanija i Razkopki* 23 (1985): 12–59; for Krum, see above, p. 184; for Lyubimets, see R. Koleva, "Rescue Archaeological Excavations at the Orta Burun Site in 1993," in K. Leshtakov, ed., *Maritsa Project*, vol. 1 (Sofia, 1997), 245–52; for Yabalkovo, see K. Melamed, "Srednovekovno zhlishte ot XI–XII vek. Spasitelni razkopki kraï selo Ybalkovo obshtina Dimitrovgrad," in *Arheologicheski Otkritia i Razkopki prez 2007* (Sofia, 2008), 733–35; for Zlatna Livada, see D. Yankov, R. Koleva, and C. Kirilov, "Spasitelni razkopki na objekt 'srednovekovno selishte i nekropol,' selo Zlatna Livada, obshtina Chirpan," in *Arheologicheski Otkritia i Razkopki prez 2008* (Sofia, 2009), 611–13.

124 Madgearu, *Byzantine Military Organization*, 125; Stephenson, *Byzantium's Balkan Frontier*, 83; Haldon, *Warfare, State and Society*, 63–64, 93–94.

125 Borisov, "Demographic and Ethnic Changes," 77; idem, "Ikonomikata na srednovekovnoto selishte vârhu selishtnata mogila

do s. Diadovo, Burgasko," *Izvestiia na muzeite ot Iugoiztochna Bălgariia* 14 (1991): 68–88.

126 *Catalogue of the Byzantine Coins*, 645.

127 *Coinage in South-Eastern Europe*, 55–62 (A2 and B folles were minted in 989–1034).

128 *Catalogue des monnaies byzantines*, 596–600 (she specifies that class B has been dated to the reign of Romanus III [r. 1028–1034]).

129 V. Penchev, "Moneti ot srednovekovnoto selishte nad Sevtopolis" in *Sevtopolis*, vol. 2, *Antichni i srednovekovni moneti*, ed. D. Dimitrov and V. Penchev (Sofia, 1984), 137–59.

130 K. Stefanova-Georgieva, "Monetna circulacia v srednovekovnoto selishte pri selo Krun, Kazanlushko, XI–XIV v.," in *Monetite i Banknotite: Vazmozni Prochiti. Iubileen sbornik v chest na professor Hr. Haritonov*, ed. P. Vladkova, G. Chohadzhieva, and V. Martinova (Veliko Turnovo, 2005), 157–59.

131 Atanasov, "Anonimnye vizantiiskie follisy klasa B"; Iotov and Atanasov, *Skala*, 126.

132 Borisov, *Keramika*, 226–28.

by the new quarter adjacent to the renewed fortress near Iskritsa;<sup>133</sup> the new chapel built on the substructure of a previous basilica in Karanovo;<sup>134</sup> and the new cemeteries in Znamenets, Polski Gradets, and Karasura.<sup>135</sup> Similarly, the late antique fortresses on the southern slopes of the Balkan Mountains were reoccupied and new ones were built between Krun and Sliven (an ancient town just north of Glufishevo).<sup>136</sup> Most fortresses on the Tuzha–Krun–Tvarditsa–Sliven line were built in the second half of the eleventh century and served the new strategy adopted by the Byzantines in response to the Pecheneg invasions. A similar line of fortresses appeared in the Rhodope Mountains, from Semchinovo through Dorkovo and Fotinovo to Sedlari, guarding the roads leading to the coastal plains along the Aegean Sea and to Thessaloniki.<sup>137</sup> The ancient forts of Iskritsa, Voden, Karavelovo, and Melnitsa, which guarded the mountain passes across the Strandzha and Sakar Mountains, were also rebuilt and reoccupied in the mid-eleventh century.<sup>138</sup>

In the late twelfth century, the passage of the armies of the Third Crusade (1189–1192) through the Balkans brought an end to most villages in Thrace. Only those that were located away from the path of the crusaders, such as Karanovo, Asenovets, and the village on top of ancient Sevtopolis, continued to exist into the first half of the fourteenth century.<sup>139</sup>

A great number of asymmetric plowshares, either from single finds or from hoards, consequently must be dated to the period between the mid-eleventh century,

when these sites were established, and the passage of the Third Crusade, when these sites ceased to be active.<sup>140</sup> Asymmetric plowshares were found in hoards near Asenovets (2), Hisar (7), Karanovo (10), Krum (13), Razlog (22), Rumanya (23), Stoil Voevoda-Ezero (26), and Zagortzi (29); these hoards are similar in composition to those in Moesia in that they include both weapons and farm implements.<sup>141</sup> Most of Thrace's hoards, however, are found next to settlements without fortifications. Single finds are also known from unfortified settlements, such as Arnautito (1), Diadovo (3, 4), Iskra (8), Kocherinovo (12), Zlatna Livada (30), and the medieval villages on top of ancient Kabile (9) and Sevtoplis (24). To be sure, most single finds are from fortified sites, namely, Glufishevo (6), Karavelovo (11), Krun (14, 15), the fortress near Haskovo Mineralni Bani (16, 17), Plovdiv (18), Pernik (19), and Voden (28). Asymmetric plowshares have been found even in fortresses of the Rhodope Mountains—Fotinovo (5), Perpericon (20, 21), and Vishegrad (27)—a region dominated by shallow forest soils that do not require the use of a moldboard plow. Most likely, those plowshares were brought along by immigrants from Moesia, who were conscripted to guard and maintain the ramparts. As shown in the catalogue and figure 3, out of thirty asymmetric plowshares from the lands south of the Balkan Mountains, thirteen were found on fortified sites and another eight near unfortified settlements, but in hoards together with weapons—a situation directly comparable to that of Moesia at an earlier date.<sup>142</sup>

A hoard of sixty-three folles of class B might be related to the same migrant population, as it was found in the fortress near modern village of Nenovitsa (in the district of Kardzhali); the same is true for a hoard of eleven folles of class B, found near the town of Rila, deposited, most likely, during the Pecheneg invasion of 1034 that reached as far south as Thessaloniki and laid waste to Thrace and Macedonia.<sup>143</sup>

133 B. Borisov, "Demographic and Ethnic Changes," 78; idem, "Keramika ot srednovekovnata krepost krai selo Iskritsa i miastoto i v keramichnia kompleks na severoiztochna Trakia prez XI–XII vek," in *Severoiztochna Trakia i Vizantia prez IV–XIV vek* (Sofia, 1993), 130–45; G. Sheileva, "Razkopki na srednovekovno selishte, krepost i nekropoli krai selo Iskritsa, Gulubovsko, prez 1989–1994," in I. Panaiotov, ed., *Maritsa-Iztok Arheologicheski Prouchvania*, vol. 3 (Radnevo, 1995), 243–87.

134 B. Borisov, "Za topografskia kontinuitet mezhdu ezicheskoto svetliste, rannohristianskite baziliki i srednovekovnia paraklis kraj s. Karanovo," *Dobrudzha* 32 (2017): 217–31.

135 Borisov, "Demographic and Ethnic Changes," 78.

136 A. Popov, *Krepostni i ukrepitelni suvrazhenia v Krunskata srednovekovna oblast* (Sofia, 1982), 29–126.

137 K. Melamed, "Mittelalterliche Bestattungssitten in den Rhodopen," *Beiträge zur Mittelalterarchäologie in Österreich* 9 (1993): 5–39, at 32–39. See fig. 3 for the locations of all of these fortresses.

138 Borisov, "Demographic and Ethnic Changes," 77.

139 Ibid., 78.

140 The one exception seems to be an example from Sozopolis (25), which is from a context dated to the fourteenth century.

141 See the description of the hoards in the catalogue.

142 See, e.g., the hoards from Ruino, Tsar Asen, Okorsh, Sredishte, and Poprusanovo, and the single finds from Skala, Dristra, and Vetren, all described in Atanasov, "Klady zemledel'cheski orudii."

143 For the Nenovitsa hoard, see E. Oberländer-Târnoaveanu, "La monnaie dans l'espace rural byzantine," 394, no. 453; I. Iordanov, "Fiskalen rezhim v bulgarskite zemi po vreme na vizantiiskoto vladichestvo," in *Istoria na finansovata i kreditnata sistema na Bulgaria*, 2 vols.



To be sure, emigration from Moesia targeted not only Thrace, but all territories south of the Balkan Mountains, including those now in western Bulgaria and eastern Serbia.<sup>144</sup> Thus, a number of new villages appeared in the Razlog Valley and on the lower course of the Struma (Strymon) River in the mid-eleventh century: Mursalevo, Beliovo, Gorna Sushitsa, Zlatolist, Laskarevo, Hursovo, Churichane Yavorovo, Yanovo, and others.<sup>145</sup> That is the cultural context of a hoard of weapons and farm implements, including an asymmetric plowshare, which was found near the modern town of Razlog.<sup>146</sup> Single finds are also known from the fortresses of Pernik and from an eleventh-century village near the modern town of Kocherinovo,<sup>147</sup> in a region with a wide variety of soil types but dominated by vertisols.

There is no indication in the archaeological data that the introduction and spread of the moldboard plow in Byzantine Thrace was associated with any particular ethnic group. The population of tenth- to early-eleventh-century Moesia, the region at the core territory of the First Bulgarian Empire, was ethnically diverse despite the name “Bulgarians,” which Byzantine authors used rather indiscriminately for what was, in fact, a melting pot of Slavs, Bulgars, and perhaps Vlachs that dwelled in the “mountains of Bulgaria.”<sup>148</sup> Turko-Mongolian, Finno-Ugrian, and Alan-Sarmatian components should not be excluded from that mixture either.<sup>149</sup>

However, the moldboard plow did not cause a “revolutionary” elimination of the old ard. As a matter of fact, ard-shares employed with the scratch-plow

appear in most hoards along with asymmetric plowshares, both in Moesia and in Thrace. This suggests an alternative use of plow and ard, a variation most likely depending upon the quality of the soil and the type of work needed, for the ard is more efficient in soil harrowing, as well as in root and stone clearing.

The size of the asymmetric plowshares from Thrace, as with those from Moesia, varies significantly. Smaller plowshares would be used for breaking up fallow land and vineyard tillage, though more often they reflected the size and number of traction animals. More than half of the Thracian finds with an established size have a length of less than 25 cm, and quite a few of those, such as the finds coming from Fotinovo (5), Kabile (9), Krun (14), and Perpericon (20), have a blade of just 8–9 cm and a socket of 6–7 cm. The small size of these plowshares is not some local anomaly, as a similar picture results from an examination of specimens found in southeastern Romania (northern Dobruža) and in Serbia. The Museum of National History and Archaeology in Constanța, Romania, has recently acquired seven symmetric and asymmetric plowshares, of which only two are longer than 20 cm.<sup>150</sup> The collection of medieval farm implements in the National Museum of Belgrade has two symmetric and two asymmetric plowshares. One of the symmetric plowshares is of 21.7 cm long, while the other three are less than 20 cm (17.0 cm, 14.4 cm, and 13.1 cm).<sup>151</sup> Two asymmetric plowshares found in Sturmen (northern Bulgaria) are also impressively small: both are no longer than 11.2 cm and only 7.2 and 8.6 cm wide.<sup>152</sup> They were most likely parts of plows drawn by donkeys, not cattle.

In contrast, within a group of six asymmetric plowshares from Rohrberg, Muntzschén (two pieces), Rötha, and Leipzig, in Germany, and Pfaffenschlag, in the Czech Republic, one is 18.5 cm long, two are 27 cm long, and three are above 30 cm long.<sup>153</sup> The

(Varna, 1981), 1:61–71; for the Rila hoard, see J. Yurukova, “Monetni nahodki otrkiti v Bulgaria prez 1980 g.,” *Arheologia* 24.1 (1982): 62–65.

144 Stanev, “Migratsia na bulgarite,” 38–46.

145 B. Tzvetkov, *Selishnata mrezha v dolinata na sredna Struma prez srednovekovieto, IX–XVII vek: Po arheologicheski dannii* (Sofia, 2002), 31–33.

146 I. Kerkelev, “Nakhodka ot orădiia na truda ot Razlozhko,” *Muzei i Pametnitsi na Kulturata* 1 (1971): 8–10.

147 I. Changova, *Pernik*, vol. 3, *Krepostta Pernik VIII–XIV v.* (Sofia, 1992), 8–9; Kerkelev, “Nakhodka ot orădiia na truda.”

148 Kekaumenos, *Strategicon* 175 (ρσ): εἰπόντος δὲ καὶ πρὸς τοὺς βλάχους· ποῦ εἰσὶ τὰ κτήνη ὁμῶν καὶ αἱ γυναῖκες νῦν; αὐτοὶ εἶπον· εἰς τὰ ὄρη Βουλγαρίας (*Cecaumeni Strategicon et incerti scriptoris De officiis regis libellus accedit exemplum codicis phototypicum*, ed. B. Wassiliewsky and V. Jernstedt [St. Petersburg, 1896], 68).

149 V. Beshevliev, “Za raznorodnata sushtina na prabulgarite” in *Pliska–Preslav* 2 (1981): 20–25, at 22.

150 C. Paraschiv-Talmatchi and G. Custurea, “Brăzdare de plug medievale din colecția muzeului de istorie națională și arheologie Constanța,” *Pontica* 41 (2008): 403–14.

151 N. Cerović, “Poloprivredne alatke iz srednovekovnih zbirki narodnog muzeja u Beogradu,” *Zbornik Narodnog Muzeja u Beogradu* 17.1 (2001): 261–79.

152 National Archaeological Institute with Museum, Sofia, inv. nos. 4167 and 4225.

153 Lerche, *Ploughing Implements*, 220, table XXXV. Similar observations are expressed in J. Henning, “Ways of Life in Eastern and Western Europe during the Early Middle Ages: Which Way

comparatively and predominantly small size of the plowshares from Moesia and Thrace confirms the results of recent zooarchaeological studies of the Byzantine world that attest draft animals of rather small size as compared to those in western and northwestern Europe.<sup>154</sup> The explanation of this phenomenon must be sought in climate differences. Instead of an equal distribution of annual precipitation, as in western Europe, eastern Europe has a drier continental climate and thus a shorter fodder-producing season. As a result, unlike Europeans in the West, medieval eastern Europeans did not develop farmsteads that combined grain production and cattle breeding, the hallmark of a manorial economy. It is reasonable, therefore, to relate the shortage of fodder supply for traction animals with the small size of plowshares found in Thrace and Moesia, especially as compared to those in western and northwestern Europe.<sup>155</sup> Technical differences between eastern and western Europe, however, also signal corresponding social variances. While the use of the moldboard plow in the West was associated with the appearance and development of the manor, in Moesia and Thrace, by contrast, its introduction and spread had more egalitarian dimensions, as it was used even by people who did not possess cattle.

The spread of the moldboard plow in the lands south of the Balkan Mountains was not a result of the diffusion of new ideas about agricultural productivity, but of outright migration, as indicated by the abrupt appearance in the archaeological record of other categories of material most typical for Moesia, such as pottery thrown on a tournette and decorated

with burnished ornaments. In other words, the adoption of the plow in Thrace had a purely opportunistic character—the pursuit of economic sustenance, in which the tilling device used for the heavy chernozems of Moesia appeared to suit very well the demanding vertisols of Thrace. More generally, the spread of the moldboard plow reveals an *ad hoc* response of the imperial government to a crisis situation, not some pre-established institutional strategy for economic efficiency. Byzantine authorities might have commissioned agricultural manuals such as the *Geoponika* or copies of Hesiod's *Works and Days* for those who could read, but they were well aware that the real calculus behind making the most of the productive opportunities of the land—either the heavy clay grounds of Thrace or the shallow stony soils of the Peloponnesus—had to be left to the knowledge and technological choices of those who made use of it. Thus, in spite of Michael Kaplan's convictions, the capabilities of Byzantine institutions should not be examined through their ability to produce technological responses to microregional soil and climatic conditions, but at a different level, as in the transfer of Moesian population to the secure lands south of the Balkan Mountains. Certainly, the rescue of people from Bulgaria, the empire's old foe, even if it were carried out for the sake of the empire's labor and fiscal needs, reveals a remarkable combination of institutional abilities and a rationale in which, as John Haldon puts it, "philanthropy merged with the practical demands of medieval Realpolitik."<sup>156</sup>

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Was 'Normal'?" in *East Central and Eastern Europe in the Early Middle Ages*, ed. F. Curta (Ann Arbor, 2003), 41–59.

154 F. Curta, *Southeastern Europe in the Middle Ages 500–1250* (Cambridge, 2006), 420; S. Bökönyi, "The Development of Stock Breeding and Herding in Medieval Europe," in *Agriculture in the Middle Ages: Technology, Practice and Representation*, ed. D. Sweeney (Philadelphia, 1995), 41–61.

155 Henning, "Ways of Life," 41–59.

156 Haldon, *Warfare, State and Society*, 275.

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## Catalogue of Plowshares from Southern Bulgaria

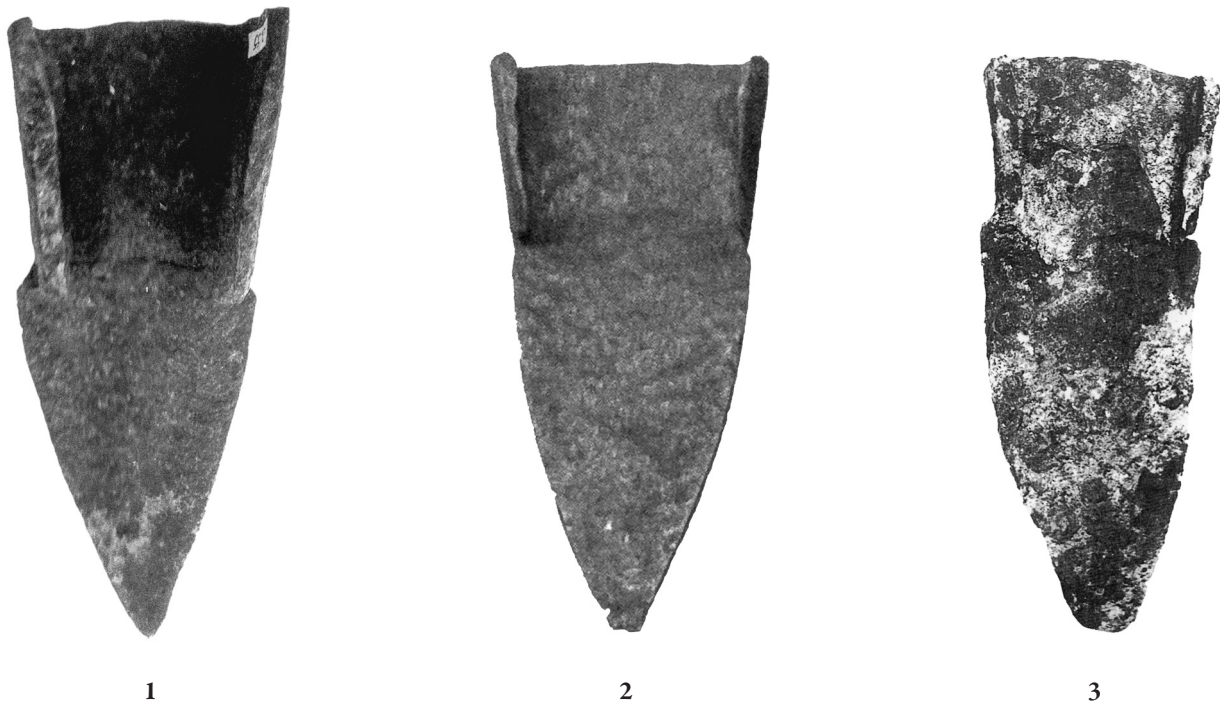
The following catalogue presents plowshares discovered in Thrace, arranged alphabetically by their findspot location (see fig. 3 for their locations). Much of the information in the catalogue comes from personal study of objects and records held in museums; any additional publications that discuss individual objects are noted within each entry. All drawings are by the author; photos are by the author unless otherwise noted. Illustrations are at a 1:3 scale except where noted.

Wherever excavation reports exist, such as those published in *Arheologicheski Otrkitia i Razkopki*, they are cited in the text. The general phrase “according to stratigraphic context” is used to summarize the conclusions of the archaeological excavations on a given site. Quite often these summaries comprise a span of several years of archaeological work and multiple field reports

on the progress of excavations, without any particular report for the date of a given plowshare. Even more, plowshares are rarely recorded even in archeological reports of recent years. Other finds are dated based on the period of habitation of the area marked by coin material and pottery, as are those, for instance, held by the museums of Nova Zagora and Kabile. It should be clear from the text that the settling of the region between the Maritsa and Tundzha Rivers took place in the eleventh century and the area was abandoned again at the end of the twelfth century, with very few exceptions, such as Sevtopolis and Perperikon. This, and parallels with similar finds of hoards of weapons and farm implements from Moesia, should offer enough evidence for the period of habitation and the type of population that inhabited the region.



Fig. 4. Plowshares 1–5.

**1 HENNING CLASS A1**

Plovdiv Museum 2455. 25 × 10.3 cm. Arnautito (district of Stara Zagora).

Accidental find. Dated to the eleventh to fourteenth century on a typological basis.

**2 HENNING CLASS A3**

Nova Zagora Museum 1157. 23 × 10 cm. Asenovets (county of Nova Zagora).

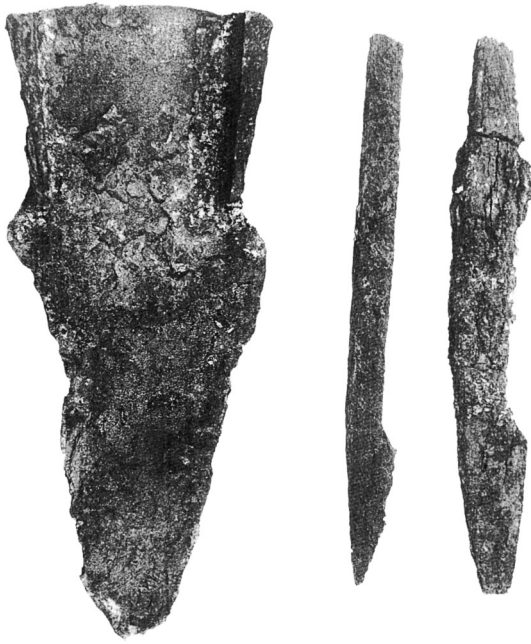
Accidental find from the area of the medieval settlement. Found within a hoard, along with an iron wool comb, axe, pruning knife, big nail, chisel, hoe, and a drag hoe (dikelli). Dated to the eleventh to twelfth century, according to the period of habitation of the medieval settlement.

**3 HENNING CLASS A1**

Nova Zagora Museum 285. 23 × 10 cm. Diadovo (county of Nova Zagora).

Found in a pit within unfortified medieval settlement near the modern village of Diadovo. Dated to the eleventh to twelfth century, according to stratigraphy and coin material. Two coulter were found in different locations of the same settlement.

B. Borisov and N. Chakalova in A. Fol, R. Katinčarov, J. Best, N. de Vries, K. Shoji, and H. Suzuki, eds., *Djadovo: Bulgarian, Dutch, Japanese Expedition. Medieval Settlement and Necropolis, Eleventh–Twelfth Century*, vol. 1 (Tokyo, 1989), 79–81.



4

4 HENNING CLASS A1

Nova Zagora Museum 294. 25 × 10.5 cm. Diadovo (county of Nova Zagora).

Found within unfortified medieval settlement near the modern village of Diadovo. Dated to the eleventh to twelfth century, according to stratigraphy and coin material.

B. Borisov and N. Chakalova, in Fol et al., *Djadovo*, 79–81.



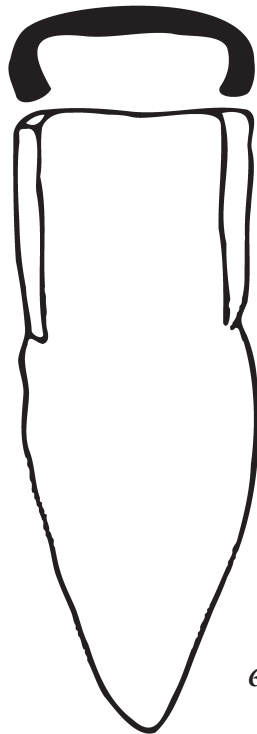
5

5 HENNING CLASS A1

Kurdzhali Museum 6281. 25 × 7 cm. Fotinovo (district of Kurdzhali).

Single find from the fortress near the village of Fotinovo. Dated to the eleventh to fourteenth century, according to the period of occupation.

Fig. 5. Plowshares 6–10.



6

**6 HENNING CLASS A3**

Sliven Museum 230. 29 cm long; no width given. Glufishevo (district of Sliven).

Accidental find near a medieval fortress in the vicinity of the village of Glufishevo. Within a hoard of thirteen items placed in a pot: one bridle bit, one wool comb, one lance head, one spatula, one pickaxe, two planes, four plowshares (one asymmetric A3; three ardshares), one iron ring, one cutting device of Henning class P1, and four coins of Alexius III Angelos (1195–1203). Dated to the late twelfth to early thirteenth century (see Gerasimov, “Dve nakhodki”).



7

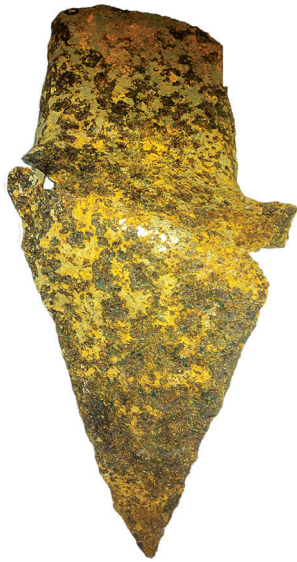
**7 HENNING CLASS A1**

No inv. no. 29 × 10 cm. Hisar (district of Plovdiv).

Found in a hoard of farm implements and weapons, together with one ardshare, one sickle, two hoes, two pruning knives, two battle axes, one adze, and one spade frame. Hoard dated to the eleventh century according to stratigraphy.

Published: A. Zaprianov, “Srednovekovni pametnici na kulturata ot Hisar,” *Arkheologiya* 9.1 (1967): 40–49, at 47. Photo: I. Dzhambov, *Srednovekovno Selishte nad Antichnia grad pri Hisar* (Asenovgrad, 2002), 59, fig. 25a.

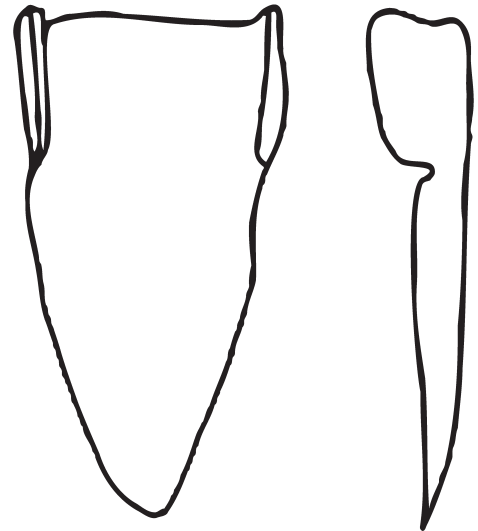




8



9



10

#### 8 HENNING CLASS A1

Iskra Museum 287. 22 × 10 cm. Iskra (district of Plovdiv).

Found in a smithy of the suburbia of a fortified medieval settlement. Deliberately asymmetric. Considerably damaged during the excavations. Dated to the eleventh to twelfth century, based on the period of habitation of the settlement according to I. Džambov, S. Popov, G. Mitrev, R. Ivanov, R. Ivanov, *Arheologičeski proučvanija kraj selo Iskra, Parvomajsko* (Asenovgrad, 2012), 52.

#### 9 HENNING CLASS A1

Kabile Museum 672. 16 × 7.3 cm. Kabile (district of Yambol).

Found with the medieval settlement on the top of ancient town of Kabile. Dated to the eleventh to early fourteenth century, according to the period of occupation of the medieval settlement.

#### 10 HENNING CLASS A1

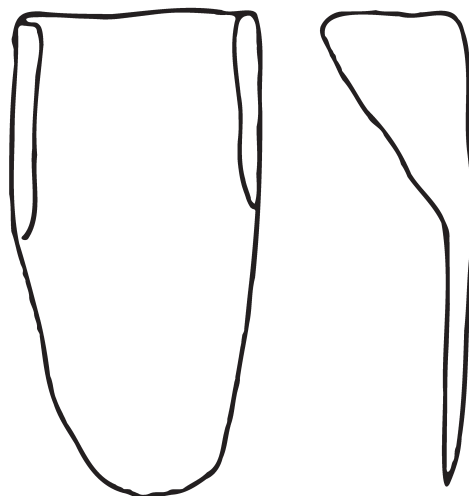
Nova Zagora Museum 1166. 20.5 × 9.5 cm. Karanovo (county of Nova Zagora).

Found in a hoard with one sickle, two hoes, and one pickax. Dated to the eleventh to twelfth century, according to the second period of habitation of the medieval settlement near Karanovo.

Fig. 6. Plowshares 11–13.



11



12

**11 HENNING CLASS A1**

Yambol Museum 3108. 26.3 × 9.5 cm. Karavelovo (district of Yambol).

Found within the fortress near the village.  
Dated to the eleventh century, according to stratigraphic context.

**12 HENNING CLASS A1**

Kyustendil Museum, no inv. no. 19.5 × 8.8 cm.  
Kocherinovo (district of Kyustendil).

Found in a medieval settlement of the eleventh to thirteenth century during salvage excavations.



13

13 TWO HENNING CLASS A2, ONE A1

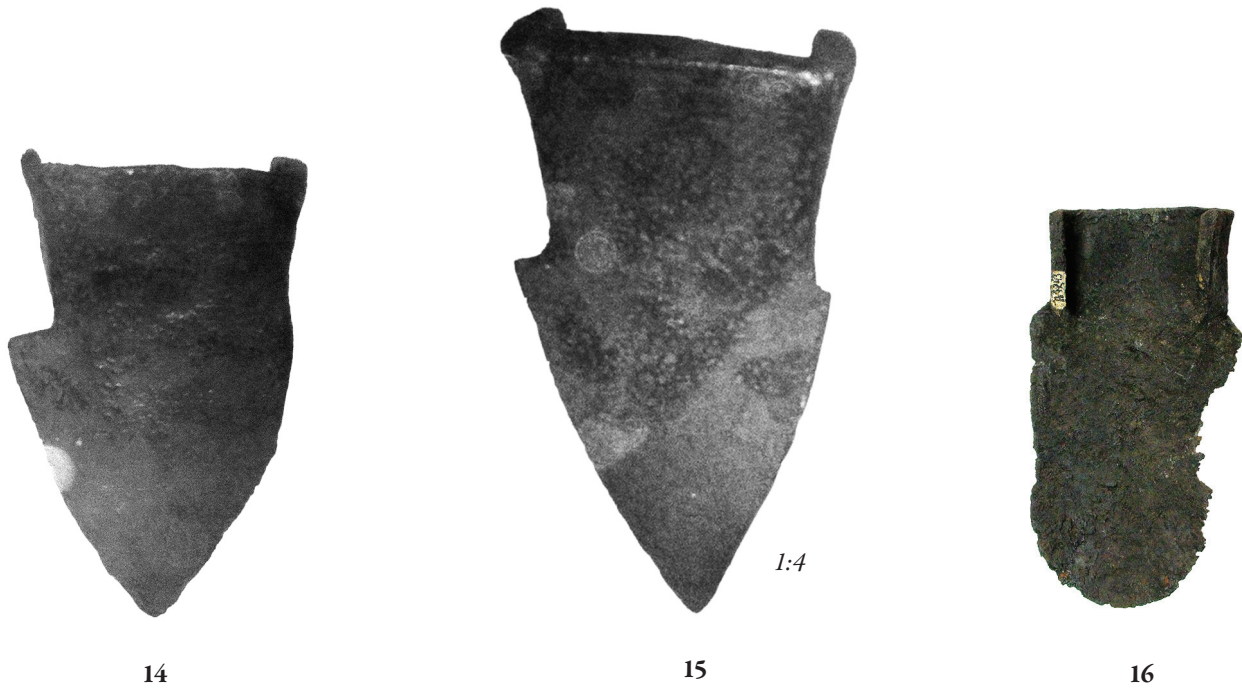
Sofia Archaeological Museum 6333, 6340, 6347.  
No sizes given. Krum (district of Haskovo).

Found in a hoard of farm tools and weapons, together with four ard shares, one scythe, four pruning knives, two goads, three *dikelli* (drag-hoes), one bent sword, one hammer axe, one lance head, and a horse bridle. Dated to the eleventh to twelfth century, according to stratigraphic context and numismatic material.

E. Evtimova, "Srednovekovno Selishte i Nekropol v Zemlishteto na selo Krum, Dimitrovgradsko," *Archeologicheski Otkritia i Razkopki prez 2007* (Sofia, 2008): 661–65.



Fig. 7. Plowshares 14–18.

**14 HENNING CLASS A1**

Kazanluk Museum 100. 18.5 × 9.3 cm. Krun (county of Kazanluk).

Found in the fortress of the medieval Krun. Dated to the eleventh to fourteenth century, according to the medieval occupational period of the fortress.

**15 HENNING CLASS A1**

Kazanluk Museum 124. 32 × 11.5 cm. Krun (county of Kazanluk).

Found in the vicinity of the fortress of Krun. Dated to the eleventh to fourteenth century, according to the medieval occupational period of the fortress.

**16 HENNING CLASS A1**

Haskovo Museum 1244. 16 × 8.2 cm. Mineralni Bani (district of Haskovo).

Found within the local fortress in a hoard with two iron shovels, one hoe, one pruning knife with a sheath, two arrow tips, and one lance head. Hoard dated to the eleventh to fourteenth century; see D. Aladzhov, *Sbornik ot statii za razkopki i prouchvanija v Haskovo i oblastta* (Haskovo, 2006), 55.

Photo: Aladzhov, *Sbornik ot statii*, 55, fig. 96.



17

**17 HENNING CLASS A1**

Haskovo Museum 1243. 20 × 8 cm. Mineralni Bani (district of Haskovo).

Found within the local fortress. Dated to the eleventh to twelfth century; see Aladzhov, *Sbornik ot statii*, 55.

Photo: Aladzhov, *Sbornik ot statii*, 55, fig. 96.



18

**18 HENNING CLASS A2**

Plovdiv Archaeological Museum III 347. 23 × 11 cm. Plovdiv.

Found inside the fortified zone of Nebet tepe. Dated to the eleventh to twelfth century, according to stratigraphic context.

**19 TWO HENNING CLASS A2, ONE A4**

Pernik Museum 1082, 1014, 1110. No sizes given. Fortress of Pernik (near the city of Pernik).

Dated to the eleventh to twelfth century, according to stratigraphic context and coin material. Changova, *Pernik*, 8–9.

Photo: Changova, *Pernik*, 8, fig. 1.

**20 HENNING CLASS A1**

Kurdzhali Archaeological Museum 8140. 16.5 × 8.2 cm, additionally enforced. Fortress of Perpericon (district of Kurdzhali).

Found in the fortress. Dated to the eleventh to twelfth century, according to stratigraphic context.

**21 HENNING CLASS A3**

Field inv. no. 665. 18 × 8 cm. Fortress of Perpericon (district of Kurdzhali).

Found in a burial. Dated to the eleventh to fourteenth century; see N. Ovcharov, “Redovni Arheologicheski Razkopki na Perperikon,” *Arheologicheski Otkritia i Razkopki prez 2014* (Sofia, 2015), 660–63. At the time of research, this piece was still not inventoried in a museum.

**22 HENNING CLASS A1**

Current location unknown. No size available. Razlog (district of Blagoevgrad).

Found in a hoard with four sickles of Henning’s class H4, one ax, and one adze. Hoard dated to the eleventh century, according to I. Kerkelev, “Nakhodka ot orădiia na truda ot Razlozhko,” *Muzei i Pametnitsi na Kulturata* 1 (1971): 1–10, at 8–10.

Photo: Kerkelev, “Nakhodka ot orădiia,” 9.

**23 HENNING CLASS A1**

Nova Zagora Museum 1180. 18 × 9.5 cm. Rumanya, near Karanovo (county of Nova Zagora).

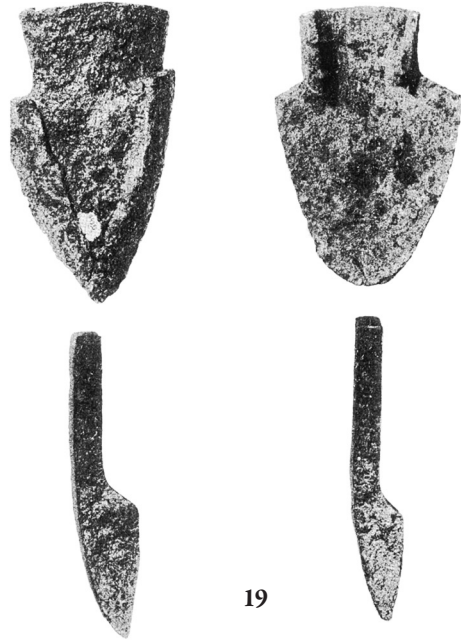
Accidental find within a hoard with one iron sheath of a shovel, one pruning knife, one ax, one sickle, and one hoe. Dated to the eleventh to twelfth century, according to the second period of habitation of the medieval settlement near the village of Karanovo.

**24 HENNING CLASS A1**

No inv. no. 16 × 8.5 cm. Medieval settlement on the top of the ancient Sevtopolis (county of Kazanluk).

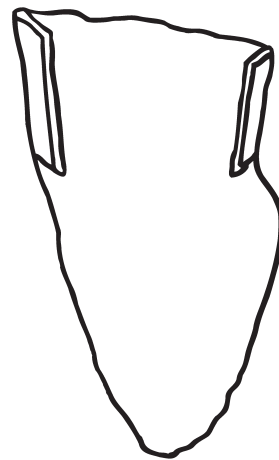
Dated to the eleventh to fourteenth century; see I. Changova, *Medieval Settlement on the Top of Thracian Town of Sevtopolis*, 40–41, figs. 25 and 26.

Fig. 8 Plowshares 19–24.



19

not to scale



22

not to scale



20



21



23



24



**25 HENNING CLASS A3**

Museum of Sozopol, no inv. no. (special display on anti-vampire burial rituals). Length unknown  $\times$  9.5 cm wide. Sozopolis (county of Sozopol).

Found in a grave of the necropolis of the medieval town. Dated to the fourteenth century, according to stratigraphic context.

**26 HENNING CLASS A3**

Nova Zagora Museum 1243. 25  $\times$  10 cm. Stoil Voevoda / Ezero (county of Nova Zagora).

Accidental find near the unfortified medieval settlement between modern villages of Stoil Voevoda and Ezero, as part of a hoard with one hoe. Dated eleventh to twelfth century, according to the occupational period of the medieval settlement.

**27 HENNING CLASS A1**

Kurdzhali Museum 5314. 17  $\times$  7.5 cm. Vishegrad (district of Kurdzhali).

Found within the fortress near the village of Vishegrad. Dated to the eleventh to fourteenth century, according to the occupational period of the fortress.

**28 HENNING CLASS A1**

Yambol Museum 1124. 25  $\times$  9.6 cm. Voden (district of Yambol).

Found within the nearby fortress called Malkoto Kale. Dated to the eleventh century, according to stratigraphic context.

**29 HENNING CLASS A3**

Nova Zagora Museum 1189. 17.5  $\times$  9.5 cm. Zagortzi (county of Nova Zagora).

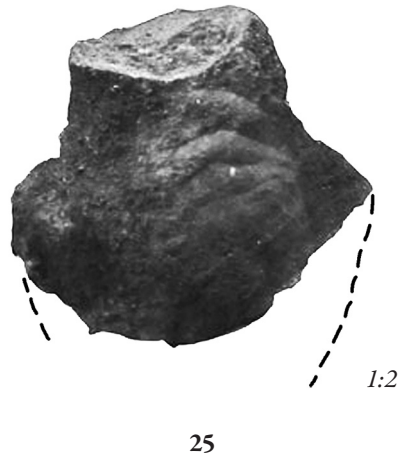
Accidental find as part of a hoard with one throwing spear, one scythe, one ardshare, and one cutting device of Henning class P6. Dated to the eleventh to twelfth century, according to the period of habitation of the medieval settlement.

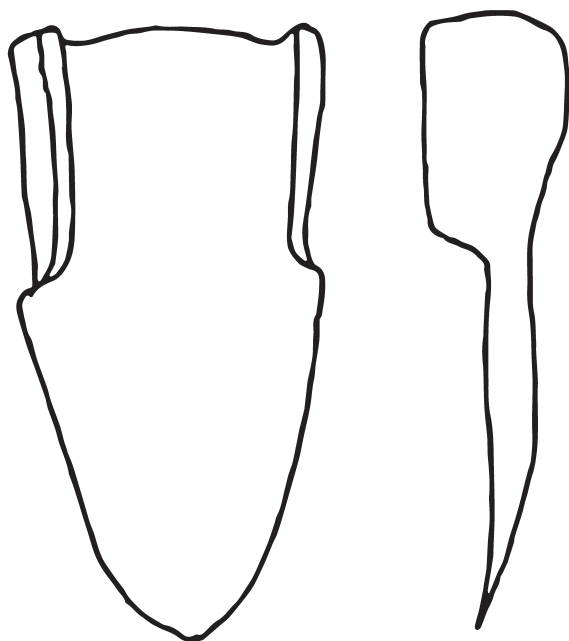
**30 HENNING CLASS A3**

Stara Zagora Archaeological Museum 2244. 26  $\times$  10.3 cm. Zlatna Livada (county of Chirpan, district of Stara Zagora).

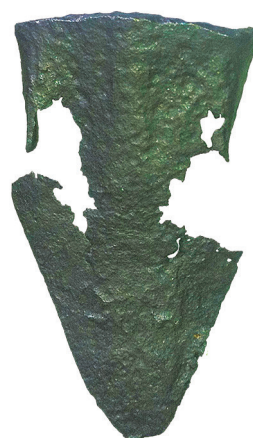
Found within unfortified medieval settlement. Dated to the eleventh to twelfth century, according to stratigraphic context.

Fig. 9. Plowshares 25–30.

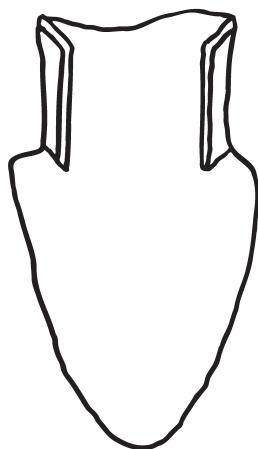




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